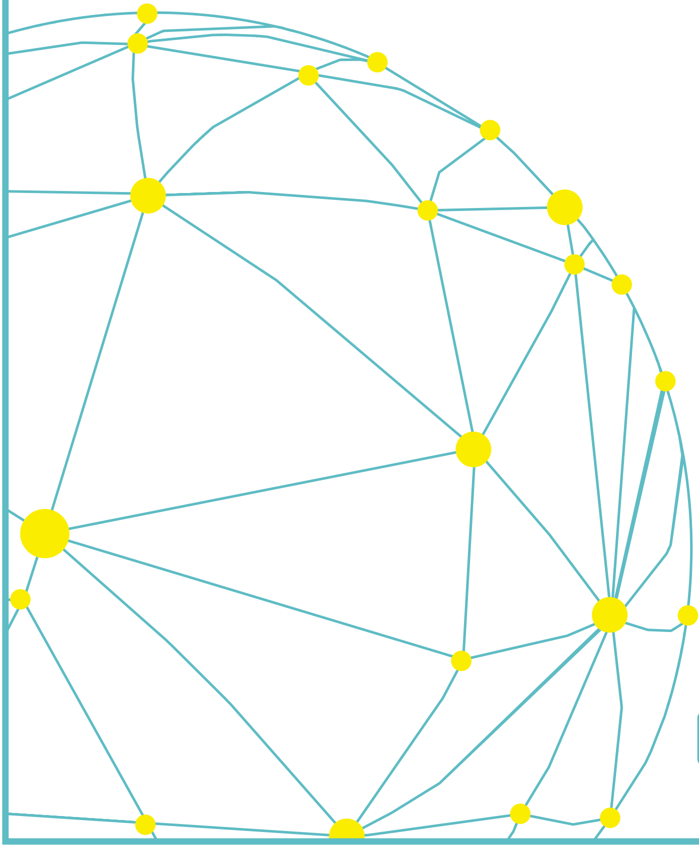
INFORMATION SYSTEM

PLANNING

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INTRODUCTION

An information system (IS) can be any organized combination of people, hardware, software, communications networks, and data resources that collects, transforms, and disseminates information in an organization.

An understanding of the effective and responsible use and management of information systems is important for managers and other business knowledge workers in today's global information society. Information systems and technologies have become a vital component of successful businesses and organizations. Information systems constitute an essential field of study in business administration and management, as they are considered a major functional area in business operations.

Chapter 1: Business Organisation Behaviour

The objective of this chapter on the patterns of people behavior at the three possible levels of human behavior in organizations: the level of individual behavior, the level of group behavior and the behavior of the organization. The course aims at mastering the theoretical knowledge and practical skills in the field of modern forms and methods of controlling the behavior of individuals and groups to improve the efficiency of the organization in procedures of staff recruitment, placement and assessment in accordance with the individual characteristics of the person, managing emotions and stress in the organization, creating motivating work environment, managing career development, team building and improving the efficiency of the group, designing effective communication flows, constructive management of organizational conflict, the formation and maintenance of organizational culture.

Chapter 2: Planning

One approach to strategic planning is to match an organization's goods and services with its markets, generally in the long term. The long term is viewed as two or more years. To minimize threats from competitive inroads and obsolescence, every business unit must have a strategic plan and constantly monitor its markets and competitors. Tomorrow's winning products must be researched, tested, developed and introduced before today's winners become obsolete. To manage its future every company needs a business strategy and a marketing strategy. The business strategy guides the corporate mission, financial and operational planning, its search for new products, technologies, and market targets. The marketing

strategy takes the business strategy as given, then focuses on matching products to markets.

Market planning involves the shorter run, annual and day-to-day, activities of developing and executing the marketing mix elements of the company's offerings. As execution is carried out, constant feedback must be assured to provide input for modifications to the marketing plan in the face of changing conditions. Every organization has a marketing strategy. It can be expressed either as written plans or as a collection of unwritten or even unstated rules. In either case, it should include a statement or understanding about the company's mission, customers, and offerings whether formalized or informal. To have no strategy is to be directionless or what might be perceived as motion without a goal. This has been the approach to strategic planning by many dot coms in recent years who have devoted far more time to developing their products than their markets.

Chapter 3: Strategic Use of Information Technology

This Chapter aims to describe how information technology (IT) affects organizations in general, and their strategies in particular.

In the 1970s, the convergence of computer and telecommunication technologies enabled organizations to consolidate a communication network among diverse geographical locations. In the 1980s, the powers of microcomputers and high-level languages for user-friendly software have enabled organizations to develop distributed processing environments. The next important issue in IT management is to transform IT into competitive advantage. Over the years, information systems developed to serve this purpose have become collectively known as Strategic information systems (SIS).

Strategic information systems (SIS) enable a firm to gain a competitive edge or to undermine its rival's advantages. For instance, by building an online reservation system that links directly with travel agents, American Airlines enlarged its market share in the late 1960s. In contrast, those firms that cannot perceive the strategic visions of IT might risk losing their business opportunities. Delta Airlines, for example, lost US$86.7 million because it failed to anticipate the strategic use of IT.

We have to emphasize here that the advance of IT or IS alone does not necessarily produce strategic advantages that the management desires. As the successful deployment of SIS has to align with the corporate

strategy, a good understanding of the relationship between IT and the methods of gaining competitive advantage is therefore essential.

Telecommunication networks and the information systems based on them play a very important role in gaining competitive advantage. Essentially they provide external links, such as those with customers and suppliers, through which information can be captured, processed, analysed, delivered and stored. Thus, these Information networks can have several strategic uses. One such important use is that these systems are capable of linking two or more organizations (rather than individuals) to build a tighter relationship, in which case they are called inter organizational systems (IOS).

Having understood the ways in which IT can be used to provide strategic advantage, you still need to know how and in what manner in order to identify specific applications of IT for a given organization. You, therefore, need to know how to use frameworks/models to assess the potential of IT in providing strategic advantage to any organization. As there are many of these tools, you need a framework to help you determine which tool to use and when.

Chapter 4: Foundations of Information Systems in Business

This chapter introduced the concepts of IS and IT strategies. IS strategy is concerned primarily with aligning IS development with business needs and with seeking strategic advantage from it. IT strategy, however, is concerned primarily with technological policies, and tackles questions of architecture including risk attitudes, vendor policies and technical standards. IS and IT strategies can be seen as the products or results of the IS strategic planning process. These strategies broadly define the approach an organization adopts in the use of IT. The IS strategic planning process also produces IS plans, which identify specific business applications that will make use of IT, as well as the technological components required to support the business applications. Hence, IS strategy and IS plans are closely related.

This topic begins with Richard Nolan's stage model. The model gives you more than a retrospective look at what has happened to IS strategies · it also suggests that the nature of IS strategy changes over time, and that all organizations do not treat IS strategies in the same way. In particular, some organizations today call themselves extended enterprises in which IS strategies are exceptionally important. An IS strategy begins with a planning phase, which has always been an important task for IS

management. The long lead time for hardware delivery, the difficulty of software development, the costs of hardware and software, and the preparation needed for user training and IS implementation all demand advanced planning.
The IS planning task, which was formerly primarily technical, has taken on a new dimension due to the emergence of strategic information systems (SIS, described in topic 3) and requires new linkages with the business planning process. Specifically, managers have had to become aware that uses of IT can have significant effects on their organizations competitive position, and that IS planning needs to be coupled more closely with the goals of the organization. In fact, IS planning, or lack of it, can now affect business plans.

Chapter 5: Information System Strategic Planning

Improved strategic IS planning is one of the critical issues facing IS executives today. Effective strategic IS planning can help organizations use IT to reach business goals. It can also enable organizations to use IT to significantly impact their strategies. However, if you don't carry out strategic IS planning carefully, the results will include both lost opportunities and the waste of expensive IT resources.

In order to perform strategic IS planning effectively, organizations apply one of several planning methodologies. A methodology should use a collection of postulates, rules, and guidelines that provide a standard proven process to follow. The importance of using a methodology is that Knowledge organized in a discipline does a good deal for the merely competent; it endows him with some effectiveness. It does infinitely more for the truly able; it endows him with excellence.

In this topic, we describe some of the conventional IS planning methodologies that have developed over the past 20 years. We include a selection of the three most representative and best-known methodologies used for IS planning: critical success factors, business systems planning, and the multiple methodology. Our aim here is not to examine all the existing methodologies in detail; rather it is to show you the underlying assumptions and circumstances. You also identify a number of weaknesses and omissions viewed in the context of the question: is a methodology complete and how does it link business strategy and IS strategy? In this context, and IS planning methodology is considered complete if it can help a planner in identifying only the IT opportunities the method intends to account for.

Chapter 6: Management Information System Planning as a Case

The plan for development and its implementation is a basic necessity for MIS. In MIS the information is recognized as major resource like capital and time. If this resource has to be managed well, it calls upon the management to plan for it and control it, so that the information becomes vital resource for the system.

The Management Information System needs good planning. This system should deal with the management information not with data processing alone. It should provide support for the management planning, decision making and action. It should provide support to the changing needs of business management. A long range MIS plan provides direction for the development of the system and provides a basis for achieving the specific targets or tasks against time frame.

MIS Goals and Objectives: It is necessary to develop the goal and objectives for the MIS which will support the business goals. The MIS goals and objectives will consider management philosophy, policy constraints, Business risk, internal and external environment of the organization and business. The goals and objectives of the MIS would be so stated that they can be measured. The typical statements of the goals can be providing online information on the stock and market; the query processing should not exceed more than three seconds and the like.

Enterprise Resource Planning (ERP) is a software that is built to organizations belonging to different industrial sectors, regardless of their size and strength.

The ERP package is designed to support and integrate almost every functional area of a business process such as procurement of goods and services, sale and distribution, finance, accountings, human resource, manufacturing, production planning, logistics & warehouse management.

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1 BUSINESS ORGANISATION BEHAVIOUR

INTRODUCTION

Look at the statement above, do you think that as an organisation we should implement certain criteria to meet the organization vision and mission? So, what should the organisation do?

Many people set-ups a business without knowing how to do it. They think it is as easy as registering the company and start selling. This is when many businesses failed due to improper planning. Hence, the objective of this topic is to introduce to you the elements of business organisation, namely its purpose, mission, functional areas and business functions. It is also going to discuss on management processes, business re-engineering, integration of business processes and its information systems.

1. ORGANISATION BEHAVIOUR

You encounter the important characteristics of the business organisation with respect to the nature of the business, its mission, goals and objectives, and its business environment. You need a very good understanding of the nature and characteristics of the business of an organisation before you can address the important issues of its business planning and organisational strategic planning the role of environmental analysis in long-range planning. Business plans form the major inputs to information systems strategic planning, which you study in subsequent topics of this course.

Every organisation has a purpose. Do not assume, though, that the purpose underlying most organisations is profit-related, as many non-profit or charitable organisations exist. Nevertheless, an organisation can be defined as a sociotechnical system whereby people work coherently to accomplish specific goals that evolve from the organisations purpose. From a systems approach, organisations are now on open systems; they interact with the surrounding environment.

Do you know what Open System is? Ok, let us take a look at this example,

take a chess club (a non-business and probably a non-profit organisation) where chess fans play chess and they all have a common goal of promoting chess to the general public. The chess fans comprise the social component of the organisation. The members gather regularly in the club that serves as a catchment area for all people with a common aim. They interact with each other not only in the game of chess but also in a social context. They develop their expertise in chess as well as friendship, and they share a common vision in seeing the club grow. In addition to their interest in chess, the executives of the chess club may aim at providing community leadership through the organisation of a chess club. The chess pieces, chessboards, chess clocks and other stationery represent the technical components of the organisation.

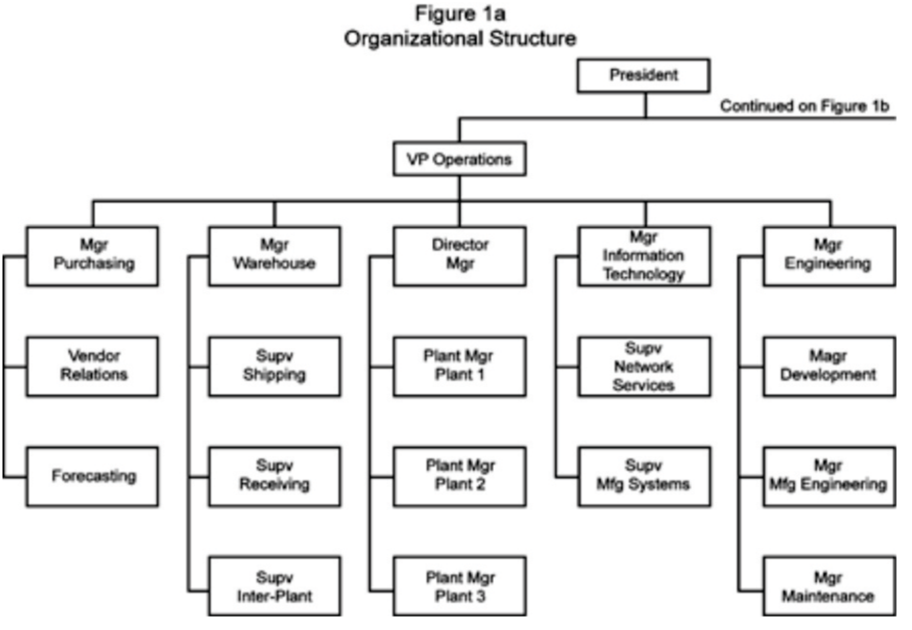
An organisations purpose leads logically to a vision and a mission statement of the way in which the organisation plans to realise its stated purpose, and business organisations in particular usually set certain goals and objectives to guide their operations. For instance, the purpose underlying a software vending organisation is to sell software, but the vision of the software vendor may be to become the most profitable company in the software industry. This can be achieved through top quality programmes and after-sales service. Goals or aims are general statements that chart the direction of a business organisation, whereas objectives are more specific. Objectives are derived from goals where they have to be measurable and have targeted timeline. For instance, "To increase sales by 100% in 2002". You'll learn more about vision, mission, goals and objectives in later sections.

A business organisation has a set of goals and objectives to be achieved. Hence, a business organisation should be structured in the most effective and efficient way to fully utilise its resources for example the capital, human resources, knowledge in products and services, and both external and internal information in order to achieve its strategic goals.

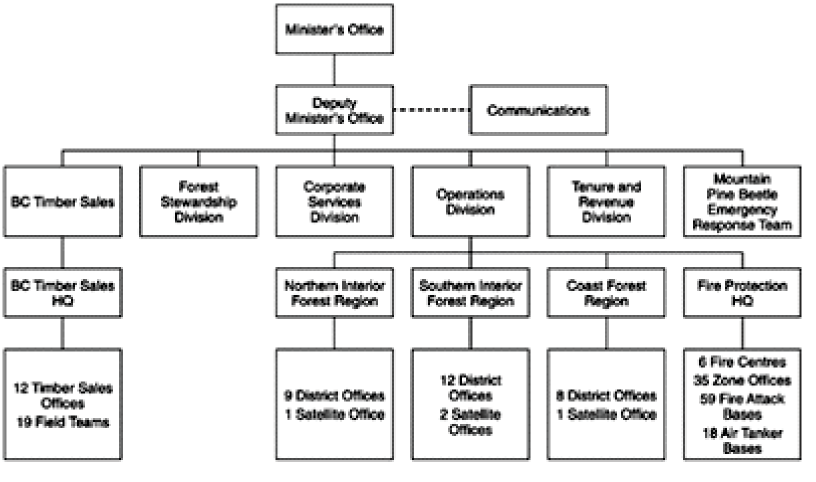
Organisations can be structured in many ways, and there are many ways in which communication networks can operate within them (and communication is the Glue that holds an organisation together). The structure of an organisation is usually depicted by its organisation chart, which identifies its management structure according to the organisational units, location, functions and their reporting relationships. You find the (formal) reporting relationships or chain-of-command within the organisation from the organisation chart.

Two types of organisation charts:

Centralised Organisation
(Tall structure)



Decentralised Organisation
(Flat structure)



(a) Decision-making authority is usually controlled tightly by the top management in a centralised organisation, but decision making itself is often delegated to middle or lower management who are constrained by often exhaustive policy and procedure packages. Not all organisational decisions must be made at the top level · top management pre-empts this need through delegation and regulation of certain types and levels of decision making.

(b) Decision making, which is often delegated to middle-level or lower-level management in a decentralised organisation, doesn't mean that the top management does not make decisions. In fact, coordinating decision making in flat organisations is essential, as no part can become Greater than the whole. Decisions in the units of a decentralised organisation must be kept in line with the purpose, vision, mission, goals and objectives of the organisation as a whole. It is interesting to note that departments in many flat organisations often operate in a Tall mode, as many middle managers seem uncomfortable with decentralisation.

The above descriptions represent some of the formal characteristics of organisations, but apart from formal structure and organisation, informal organisation exists among personal interactions and employee relationships (which are not shown by the organisation chart). An informal communication network known as the grapevine, which carries gossip and other information throughout an organisation, often supports this.

This has been a very brief snapshot of organisations, but it needs perhaps a video camera to capture the dynamic nature of organisations. Both organisations, and the business environment in which they fight to achieve their purpose, are not static. The purpose, vision, mission, goals, objectives, organisational structure, chain of command, and especially personnel (managers and subordinates) do change in response to the ever-changing environment. In a healthy business organisation, the only constant is change · in ways of responding to the business environment at least. A Manager needs to understand his or her functional role in the organisation in order to fit into the dynamic business environment. Learning the relationship between the function of MIS and the others is crucially important.

1.2 FUNCTIONAL AREAS AND BUSINESS FUNCTIONS

A business organisation often includes:

(a) Functional areas such as administration, human resources, finance,

management information systems (MIS), production, marketing, sales and purchasing.

(b) Business function is a group of activities and processes for supporting a specific part of the mission of the enterprise, and each activity or process is usually supported by a set of procedures.

You should

- Know that business functions are the basic building blocks of a business enterprise and that they exist in various organisational structures.
- Study what a function does rather than how the function does it or where it is done.

In this section, you will learn that some functions grouped under the usual functional areas of marketing, human resources, finance, management information systems, production and purchasing as presented below in Table 1.1.

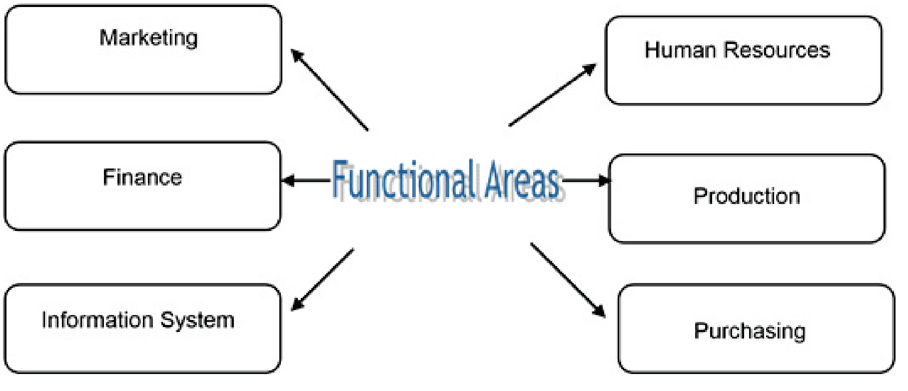


Figure 1.1: Functional Areas Group

1. Marketing is a functional area that performs marketing research to identify and determine what products and services customers want. It is therefore necessary for the marketing department to liaise closely with the production department so that they will know and understand what the products will do or will work. Marketing also initiates, plans and launches new products and services supported by advertising and promotional programmes in collaboration with advertising and public relations agencies and the media.
2. Human Resource is a functional area that provides services in support

of business functions such as recruitment, selection, training, appraisal, and promotion of staff. It also administers personnel records, salary structure, fringe benefits and compliance with labour ordinances. It defines and revises job specifications and, when requested by unit managers, creates new job openings. Human Resources Department in medium and small organisations often performs the administration function, which could be a separate department in large organisations. The administration functions are responsible for all support services including clerical, typing, filing, maintenance of the office accommodation, transportation, reception, telephone, telex, facsimile and communications systems, collection and delivery of documents, security, advertising and other activities that are necessary for ensuring the smooth running of the organisation. In certain organisations, administration may have to deal with relevant legal matters and to liaise with MIS, purchasing, insurance and share registrations.

3. Finance is a functional area responsible for financial accounting, management accounting, and sometimes for corporate finance and investment management.

(a) The financial accounting section undertakes responsibilities in bookkeeping, maintenance of audit trails, preparation of trial balances, balance sheets, and profit and loss statements. Annual closing of books and liaison with the company's auditor are also part of the responsibilities of financial accounting.

(b) Management accounting undertakes all tasks relating to management reporting of labour and material costing, allocation of overhead expenditure, job and process costing, cost-volume-profit analysis, budgeting, variance analysis, capital investment decisions and organisation controls.

For big corporations such as the MTRC (Mass Transit Railway Corporation), the Finance Department also undertakes responsibilities in corporate finance and investment of surplus funds. On one hand, the corporate finance section raises capital for the corporation at the lowest possible costs. This could be achieved through public flotation, rights issue, bonds, debentures, term loans and other financial instruments in the foreign exchange, money and capital markets. On the other hand, surplus funds can be deposited at a bank with a minimal return. Alternatively, funds can be invested in the financial market to reap more profit; this is the investment strategy of big corporations like Jardine Matheson, which operates a dealing room within the

company.

4. Management Information Systems (MIS) is a functional area charged with the responsibilities of developing, maintaining and the smooth running of computer systems that capitalises IT to achieve organisational objectives. Such computer systems are classified into strategic planning, management control and tactical planning, and operational control systems. In recent years, organisations involved in online business might develop an e-commerce section under or independent of the MIS function. For example, Qantas Airlines expanded its e-commerce department in 1999 to take care of online alliances with other airlines, e-ticketing and e-booking.
5. The Sales Department sells whatever products and services the business organisation offers (produces). It forecasts the sales volume by products and builds up a salesforce that provides the best coverage in all the sales territories. The Sales Manager should maintain a close link with the production department as well as with the marketing department.
6. Production is a functional area responsible for production operations (in producing goods and services that meet the production plan) and quality assurance. It also ensures the effective and efficient utilisation of the production plant to meet customers' orders, maintains an optimal level of work in progress and minimises the reject level.
7. Purchasing is a functional area responsible for the sourcing, supply and logistics of goods and raw materials that meet the stipulated cost, quality and inventory policy requirements while matching the production schedule.

Note that the aforementioned seven functional areas are described mainly from a staff perspective; you may see that functional managers are responsible for the routine operations within their functions and translate decisions from strategic management to tactics or operational solutions. However, functional managers are also responsible for making their own decisions; that is, they have a Line function and are making decisions that affect their own unit or department.

It is thus the strategic managements capacity to identify business functional areas and define the roles of functional managers. You must also be able to analyse the processes involved in each function before seeing how they could work collaboratively to achieve the aim(s) of the organisation. In the following section, you'll study the generalized management processes in business functions.

1.3 MANAGEMENT PROCESSES AND BUSINESS PROCESS REENGINEERING

All business organisations should have a pre-defined set of goals and objectives whilst individual business functions should also have their own sets of goals and objectives. When competent managers strive hard to perform their duties in the specific business functions, their work is usually appraised by the extent to which the organisation can meet its goals and objectives. Managers need to carry out certain processes in order to achieve these ends; that is, their business functions can be subdivided into management processes make up the basic duties of a business engineering manager.

Business process has two characteristics:

(a) It has customers (internal or external);

(b) It crosses functional boundaries (i.e., it communicates between functions through its inputs and outputs).

By using the well-known value chain method we can identify business processes in an organisation.

Today's management theories see business processes as the building blocks to support the organisational strategy. To aim for a dramatic increase in competitive advantage, management may consider a radical re-engineering of business processes. Re-engineering means:

When applying the word re-engineering, the usual methods of rationalisation and automation are no longer appropriate. The application of business process reengineering (BPR) has brought tremendous success and profits to many organisations. However, you should understand how much the success of these BPR exercises is related to the information systems strategies of those organisations. The information systems are being looked upon as an effective and efficient way to implement management and business processes.

Let's look at what are processes involved in managing a company or business Figure 1.2. There are four generic management processes involved.



Figure 1.2: Generic Management Processes

(a) Planning

Planning is the decision of who is going to do what by when, or what is going to be done when by whom, depending whether the management style is process-oriented or product-oriented. Planning charts the course for a business function in a rapidly changing business environment as the function supports the organisation to move forward to where it wants to go. Hence, the first step in a planning process is the definition or a clear understanding of the functional goals. Sometimes goals are not available; then, you should delineate goals from the corporate mission statement or corporate goals and objectives.

Objectives must be targets that are measurable within a certain time frame. For instance, the goal of a business process plan might be to develop a computer-telephony integration (CTI) system to replace the slow-responding call centre in the service department and the objective might be to provide an automated response to any customers call within one second.

The structure and format of the plan may vary from one function to another depending on the needs of the function and the functional manager. For example, sometimes it is the duty of branch (or unit) managers to undertake the planning and they need to negotiate a satisfactory plan structure with each other and with their superior function manager. It may be a collection of business procedures, each of which has its objectives, to be accomplished in sequence or in parallel. The resulting business plan (or a draft) should include the following information:

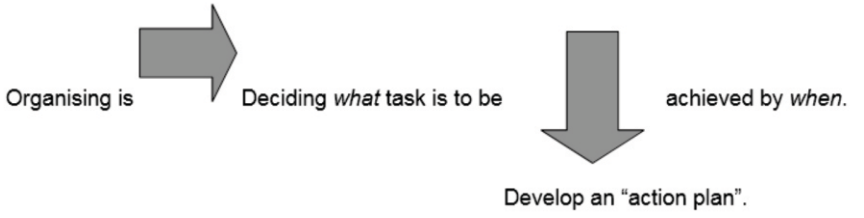
- plan objectives;
- core activities (tasks) and procedures;
- initiatives and requirements; and
- key performance indicators and appraisal methods.

Keep in mind, especially if you work in a decentralised (flat) organisation, that any planning decisions you make could significantly influence the operations and planning of other functional areas. Planning is not an isolated business process; it requires collaboration with other functions.

(b) Organising

After the objectives or plans have been line-up, managers need to organise their own and their subordinate's activities to accomplish the

objectives of the plan. This process includes obtaining necessary resources like finance and equipment, and organising and scheduling each facet of the plan.



It is usually required to break tasks into smaller units (the sub-tasks) and allocate sub-tasks to capable individuals with definite completion dates. The managers of each unit must develop an action plan which can help to coordinates and orchestrates the entire project on paper to allow the task to be completed on time.

Keep in mind that organising might require the support of other functions such as human resources (HR). For example, if you were planning to expand your department, you might need HR to help you in recruiting, training and performance appraisal of employees in your department. Therefore, HRs planning must be formulated, in part, based on the plans of your function. To coordinate with your plan, HR has to include in its own plan a recruiting exercise to advertise the job vacancies and to find the right applicants whose personality profile, character, values, beliefs, qualifications and experience, upbringing and skill set match with both the job specification and the corporate culture. You usually interview to select the right person. For certain jobs · a computer programmer for instance · the applicants may be required to take an aptitude test.

There are several dimensions in training, which include job-related training and induction courses. Job-related training could be on-the-job training within the organisation, or it could be specialised training courses offered by an outside training company. In-house induction courses aim to familiarise the new employee with the company's rules and regulations, policies, environment and corporate culture.

Performance appraisal is conducted regularly for employees who are evaluated on the extent to which they achieve certain mutually agreed objectives. They are given a total score that is a reflection of their performance during the period. The score is also a basis for salary increases and promotion.

You should perceive in this example that there is a continual need for coordination of activities between functions. As each function has to plan and organize its own business processes, the collaboration and is necessary to ensure that each process does not get in the way of others and every process is accomplished towards the goal of the organisation.

(c) Directing

Following the organising stage, the activities of the plan are carried out in the directing stage. The managers implement or execute the plan as it was organised, and resources and personnel are deployed according to the pre-determined time sequence. The process leader (who may not be the functional manager) leads, motivates, delegates and coordinates in order to complete the process.

It is often argued that a leader is born but the leadership that a manager possesses can be trained through management development and training programmes such as an MBA (Master of Business Administration) degree. Studies distinguish two leadership models:

(I) transactional leadership: routine business process

(ii) transformational leadership: a process bringing great change to a function which needs a leader who is an expert.

There are a variety of ingredients that lead to effective leadership. The Leadership effectiveness framework depicted in Figure 1.3 shows some of the elements.

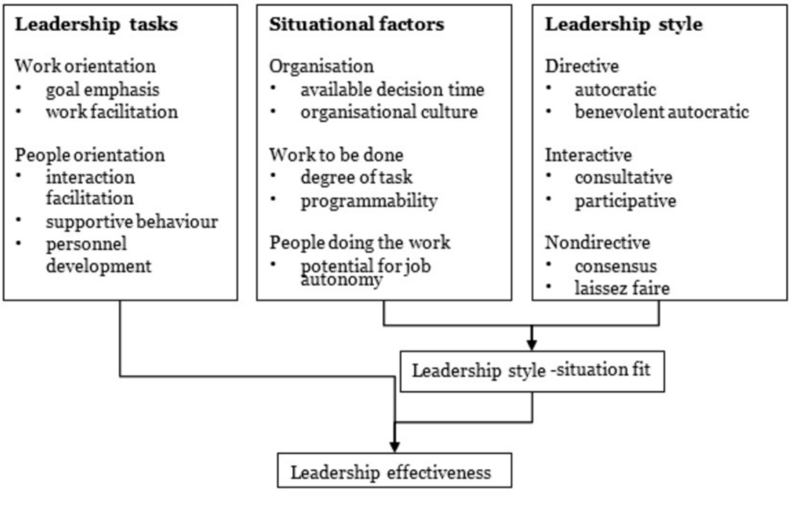


Figure 1.3: Leadership effectiveness framework.

Motivation, on the other hand, requires an in-depth analysis of the factors that might motivate an employee; those factors may include the sense of achievement, recognition, responsibility, the work itself, and personal growth and development. A competent manager should be able to motivate his or her subordinates to consistently perform at their highest potential. It is not easy to handle the subordinates as each and every one of them has different personalities and behaviours. As a manager, he or she has to learn and understand the characters in order to work hand in hand towards achieving company's objectives.

To direct a task or duty, the manager often needs to delegate the duty or task to other people. Whether the process is successful is largely dependent on the right delegation. The leader who is responsible for completing a process on time must assign the work (tasks or subtasks) and transfer her authority and responsibility to her subordinates in the working team. How to delegate is an art, though. A manager must take into account how critical the sub-task is, the capability of the subordinate, the subordinates work history, motivating factors and the completion date. Although responsibility is passed on from the superior to subordinates, the superior is still held responsible and is still accountable.

When the process is divided among small groups of individuals, each group may have different requirements concerning information and other resources. The manager should have the basic skill of coordination to ensure tasks are accomplished in a logical and efficient way · with an acceptable degree of waste or delay.

(d) Controlling

As soon as managers have implemented a plan, they need to know the extent to which they have accomplished their missions. In other words, they need to find out what the gap is and then take action to bridge or close the gap.

In controlling any task or duty, if a variance is beyond the pre-defined tolerance level, some adjustments or remedial actions must be arranged. The standard could be a capital budget, sales volume or defect level. The variance is a measure of how the actual performance deviates from the standard, or the budgeted amount. Managers can then investigate the causes of the deviation, and determine any corrective action. The proposed actions act as feedback information that may revise the standard or budgeted amount. Hence, controlling is often an iterative process.

To review briefly, apart from the generic management processes, business processes are usually more specific to the particular functions they support. A business function is a group of activities and processes for supporting a specific part of the mission of the enterprise. It is a specific ordering of work activities across time and place, with a beginning, an end, and clearly identified inputs and outputs a structure for action. Each process is supported by a set of specifically designed procedures.

Now you should understand some basic management processes and should have noticed their universality among many business processes. In the following section, you'll see how information systems are being used to help smooth management processes and integrate with one another to achieve the corporate goals.

1.4 INTEGRATION OF BUSINESS PROCESSES AND INFORMATION SYSTEMS

You have learned in the previous section on the management processes. You should know that any business process (e.g. product development, claims processing, or supply fulfilment) could be organised as an architecture of subtasks, delegated personnel, and management processes (planning, organising, directing, and controlling).

(a) What is organisation architecture?

- It is something that represents the governance of the company, its culture, human resource policies, and internal relationships between employees and between functions.
- It is human-cantered.
- It influences the skill set of managers, their management processes, and the success of business processes.

(b) What is information architecture?

- Orchestrating business processes.
- It acts as a bridge between the architectures of organisation and process.
- The planning and implementation of the information structure (the database), the information technology (IT) infrastructure, and the information systems (IS) applications will result in the Business Process Re-engineering (BPR) exercise.

The value of the information architecture in Clues theory is mainly

attributed to its capacity of being used as an efficient means of communications. There are intra- and inter-organisational communications. Communications can also be divided into transactional and relational. You should now go through the following reading in your textbook and see how IT units and business units are strategically integrated through communications.

Note that the three architectures in Clues theory are inter-related. Even though designing an information architecture is central to a BPR project, management needs to review the organisational and departmental mission statements, business goals, functions, processes and procedures while planning, analysing, and designing an information system. Changes to a business function or a process may also affect the organisational structure.

With advances in information systems (particularly database, artificial intelligence and client-server computing) management finds information possessed by the organisation as a valuable asset. The term Knowledge Management (KM) suddenly becomes fashionable. Even at the level of business processes, applying the right kind of knowledge is regarded as being key to the success of the processes. Maintaining and enhancing the quality of knowledge in an organisation is crucial to its survival in an increasingly competitive marketplace. For example, successful management of a supply chain may depend on the knowledge of raw materials, planning, manufacturing and distribution; and a product development process requires knowledge of consumer requirements, application of new technologies, and marketing research, etc.

The following article will give you a brief account on knowledge management.

Today, BPR and KM are common practices with the availability of networking and databases. These practices help to build infrastructure and link the departments processes and functions within the company. The BPR and KM are used a tool to increase strategic advantages to an organisation. However, this cannot be done without first understanding the strategic needs of the organisation. Although the strategic needs may change from time to time, they usually conform to the mission and vision of the company, which are subjected of the next section.

1.5 BUSINESS MISSION AND VISION

Remember that every organisation has a purpose · a reason for being. Businesses seek to provide profits for their shareholders, hospitals seek to care for health of patients, universities seek to discover and disseminate new knowledge, and government agencies seek to help the public.

Mission

Every organisation also has a mission, so what is mission? Mission is –

- A broad Philosophical statement that ties an organisation to certain activities and to economic, social, ethical or political ends.
- It represents a general framework within which the organisation operates, and may contain statements of What we believe in, who we are, or What we do at a very general level, or statements of an inspirational nature such as to be the World's Number One Airline.
- Organisations character, identity and reason for existence.
- In fact, many organisations have very detailed mission statements drawn up by their top management.
- Mission is still a relatively neglected area of management, and there seems to be no clear agreement on what it encompasses.
- Some management thinkers view mission as an esoteric and somewhat irrelevant preoccupation that haunts senior managers, whereas others see it as the bedrock of an organisation's strength, identity and success· its personality and character (Campbell and Young 1991b).
- Purpose and mission are related but they are not the same things. To illustrate the difference between purpose and mission, consider two watch manufacturing companies· Timex and Rolex. Both have the same purpose · to make money by selling watches · but they have very different missions. Timex emphasizes low-cost, reliable watches that can be purchased anywhere. But Rolex sells high quality fashion watches for high prices only through selected stores.

Despite the diversity of opinion about mission, there are two broad approaches to describe mission:

1. according to business strategy

– mission is a strategic tool that defines the businesses' commercial rationale and target market.
– is linked to strategy but at a higher level.
– It exists to answer two fundamental questions: What is our business

and What should it be? companies tend to define their businesses either wrongly or too narrowly.

2. according to philosophy and ethics.

- mission as the cultural Glue enabling an organisation to function as a collective unit.
- This cultural glue includes strong norms and values that influence the way in which people behave, how they work together, and how they pursue the goals of the organisation.
- Mission in this form is more like a business philosophy helping employees perceive and interpret events in the same way and speak a common language. The example Mission statement is a good reflection of the organisational culture, values, beliefs, business ethics and social responsibilities.

However, it is important for an organisation to define its business mission correctly so that it may focus on Customer need rather than on production technology. Such a mission statement should include a clear description of what are the current and the future expectation of the company. This is expressed as a broad description of the products, markets and geographical coverage of the business today and within a reasonable short time frame, commonly three to five years. The statement of business scope is informative not only for what it includes but also for what it leaves out. Examples of such mission statements are given below

> At IBM, we strive to lead in the creation, development and manufacture of the industry's most advanced information technologies, including computer systems, software networking systems, storage devices and microelectronics. We translate these advanced technologies into value for our customers through our professional solutions and services businesses worldwide. (Mission statement of IBM.)

Both these approaches to defining mission are apparently incomplete and need to be synthesized to provide a holistic framework. This is because mission is about culture and strategy. In fact, a mission exists when strategy and culture are mutually supportive. In fact, within this holistic framework, purpose becomes part of mission, which is divided into four interrelated elements: purpose, strategy, behaviour standards and values (Figure 1.2).

1 Purpose, as stated above, addresses why an organisation exists. For whose benefit is all this effort being put in?

2 Strategy provides the commercial logic for the organisation. It considers the nature of the business, the desired positioning versus other companies, and the source of competitive advantage. Purpose and strategy alone are empty intellectual thoughts unless they can be converted into action, and into the policy and behaviour guidelines that help people decide what to do on a day to-day basis.

3 Thus, behaviour standards are the norms and rules of The way we do things around here. As an example of how an organisation's purpose and strategy could be successfully converted into tangible behaviour standards and actions, consider British Airways. It promotes itself as the World's favourite airline and declares its aim as to be the best and most successful company in the airline industry. The strategy to achieve this is based on providing good value for money, overall service that is superior to its competitors and friendly, professional managers who are in tune with the staff. These strategic objectives are translated into policies and behaviour guidelines such as the need for in-flight services to be at least as good as those of competing airlines on the same route, and the requirement that managers and employees should be helpful and friendly at all times. By translating purpose and strategy into actionable policies and standards, top management at British Airways was able to dramatically change the airlines performance. Central to this effort was the training and behaviour change connected with the slogan Putting People First.

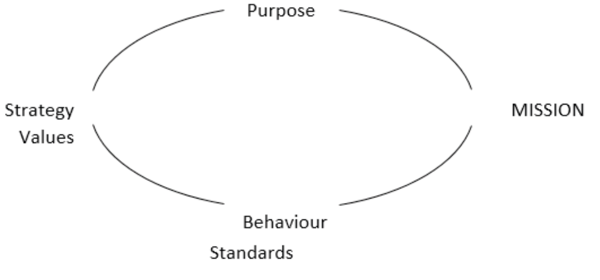


Figure 1.2: A holistic model of an organisation's mission

1 Finally, values are the beliefs and moral principles that lie behind the behaviour standards or the organisation's culture. In many organisations, corporate values are not explicit and can only be understood by perceiving the philosophical rationale that lies behind management behaviour. For instance, in British Airways, there is a

good business reason for Putting People First, but there is also a moral reason; we are all people and life would be better for all of us if we take a little more care of each other. This moral rationale was put high on the agenda when 35,000 British Airways staff were trained on the Putting People First programmes.

Mission provides a rationale for action. It links behaviour standards with purpose in two ways:

1 the strategy link explains that certain behaviour will help make the organisation successful; and
2 the values link explains that certain behaviour is morally the right way to behave.

A strong mission exists when the four elements reinforce each other. This can be easily seen by looking at the links between the strategy and the value system and whether both can be acted out through the same behavioural standards.

Vision

Another term that is often used to guide an organisation's strategy is vision. A vision is required when an organisation wants to change itself in some radical way. In the past, organisations that have been most successful in changing their performance radically, are those that have been successful in convincing their employees about the Need for change and provide them with a vision of what the organisation needs to become. By expressing the vision statement, this forces management to think clearly about the purpose of their change programme and about the extent of the change that needs to be effected.

- Represents a view of a realistic, credible, attractive future for the organisation a condition that is better in some important ways than what exists at present.
- Describes how the company is going to operate and outlines the kind of results it must achieve.
- It is both a qualitative and a quantitative statement, which a company can use again and again, before and during change, as a reminder of the objectives for change, as a yardstick for measuring progress of the change, and as a prod to keep the change action going.
- A powerful vision statement contains three elements:

− Focus on operations

- Contain measurable objectives and metrics
- It should change the basis for competition in the industry.

Example of a simple and powerful vision statement

Federal Express: We will deliver the package by 10:30 the next morning

Theoretically, a vision and a mission can be one and the same if the possible and desirable future state can include all four elements of mission. But vision and mission are not fully overlapping concepts. Vision refers to a future state, whereas mission more normally refers to the present.

What would you call this statement: a mission or a vision? Why? Evaluate the statement for its completeness if you consider it as a mission or for its power if it is a vision. Every organisation has a purpose. It may be profitability in profit-making organisations, or service quality in non-profit organisations.

An organisation also has a mission, which specifies how it will achieve its purpose. The mission of an enterprise is the highest level of its objectives. Most mission statements reflect the organisation's future aspirations or its culture, values, beliefs, business ethics and social responsibilities. However, such statements are incomplete, as a mission should include both of these aspects. Thus, a mission should include four interrelated elements: purpose, strategy, behaviour standards and values. A strong mission would exist when these four elements reinforce each other.

An organisation may also have a vision if it is planning for a radical change. A vision statement describes the image of an organisation's possible and desirable future state. A powerful vision statement should have three characteristics: it should focus on operations, it should include measurable objectives and metrics, and it should change the basis for competition in the industry.

Mission and vision are not fully overlapping, as mission focuses more on an organisation's behaviour whereas vision is more associated with a goal. However, in times of change, a new mission may coincide with the organisation's vision, as both will refer to an image of the organisation's desirable future state.

1.6 BUSINESS OBJECTIVES AND GOALS

A business enterprise needs guidance and a direction in which to go in order to perform successfully. The first task, therefore, in the organisational planning process is to set goals and objectives for the enterprise. Goals are general statements about the direction in which a business enterprise intends to go, without stating specific targets to be reached by particular times.

Thus, the mission of an enterprise is the highest level statement of goals (and objectives) as it gives a broad description of the purpose and policy of the enterprise. Business goals of an enterprise are usually described by reference to profitability, growth, market share, diversification, employment and social responsibility. An example of an organisational goal might be to increase its market share. This goal can be given specificity by translating it into objectives.

As an example, refer to the mission of the KCRC, Hong Kong. To fulfil this mission, the corporation has defined the following as its goals:

- serve customers and meet performance pledges
- fulfil both Government and corporate objectives
- maintain financial strength
- develop sound business partnerships
- build teamwork and commitment in staff
- encourage initiative and reward success.

Objectives are precise, well-specified targets that are measurable, and a business enterprise intends to achieve them by a given time.

One target (goal) may give rise to several objectives. An objective is thus an operational transformation of one or more business goals. An airline may have as its goal: Define more profitable route structure, which may lead to the objective: Eliminate all routes with an average seat occupancy of less than 40% by the end of the year.

It is desirable for an enterprise to analyse its goals and objectives and put them in writing, because if everybody understands them clearly, the enterprise is more likely to achieve them. Objectives should be worded to express a precise course of action. A vague statement such as Be a market leader could at best be a goal but it is not an objective. However, Increase sales by 40% per year is a precise objective. Thus, objectives should be

precise where possible, they should focus on results, and they should breakdown into work that has to be done.

Objectives should be measurable. Sometimes this measure could be a binary one: either the objective has been achieved or it has not. For example, appoint a new Financial Controller has a binary measure. It is also a hard measure because it could be obtained directly and precisely. Where possible, a hard measure should be applicable to an objective. But sometimes a soft measure, i.e. one that is indirect and imprecise, may have to be used due to the nature of the objective. For instance, improve market image of the enterprise may only have a soft measure. The extent to which such an objective has been met may be established only through marketing research interviewing techniques.

Different goals can have different times within which they should be achieved. Based on this period, usually called the planning horizon, goals may be classified into several levels:

1. Long-term goals relate to extended periods, usually five years or more into the future.
2. Intermediate goals (or possibly objectives) deal with one to five years. Organisations usually have several different intermediate goals related to different business areas. For instance, marketing's intermediate objective might be to increase sales by 3% in two years, human resources might seek to cut turnover by 10% in two years, and finance might aim for a 3% increase in return-on-investment in three years.
3. Short-term objectives for the very near future, usually less than, or up to, one year. These objectives are also developed for a variety of different areas in order to cater for their existing problems and/or opportunities. Examples of such objectives might be Increase sales by 2% by the end of year, Cut costs by 1% by the end of next quarter, etc.

Some examples of goals are given in Table 1.1 below:

Table 1.1

Goal area	Indicator	Objective (1 year)	Long-term (5 years)
Market share	Per cent	10%	35%
Growth	$ sales	$400 million	$600 million
Profitability	ROI	0.12	0.15

Debt	D/E ratio	0.40	0.30
Stockholder	EPS	$2.40	$4.80
Employee	Turnover	< 12%	< 8%
Society	Charitable gift	$5 million	$10 million

The level of the goals determines who in the organisation will set them. For example,

Mission statement Board of Directors
Long-term goals Top managers
Intermediate goals Middle managers (with Top Managers)
Short-term objectives First-line managers (with Middle Managers)

SUMMARY

- Goals are clearly defined general statements that are attainable in the future. They do not, however, state specific targets to be reached by particular times.
- Objectives are specific targets that a business enterprise intends to achieve by a given time. Objectives should specify a precise action and should be measurable.
- Goals are classified into three levels on the basis of their planning horizon. Long-term goals usually relate to a planning horizon of five years or more. Intermediate goals deal with planning horizons of one to five years; and short-term goals (likely objectives) deal with period of less than or up to a year. Goal setting is the process of defining goals (and ultimately objectives) at various levels of the enterprise.

GLOSSARY

The glossary provides brief definitions or descriptions of the main technical terms you encountered in the topic.

Business functions are the basic building blocks of an enterprise and they must be present, regardless of what the organisational structure is. Business functions are usually grouped under different functional areas such as human resources, finance, marketing and MIS. Each business function consists of a group of business processes that are supported by their respective business procedures.

Business process	- A specific ordering of work activities across time and place, with a beginning, an end and clearly identified inputs and outputs · a structure for action.
Business strategy	· Strategy for achieving the goals of a particular business within a corporation.
Centralized organisation	· Decision-making authority is usually tightly controlled by top management in an organisation (often result in a tall structure).
Chain of command	· Reporting relationships within an organisation; the flow of decision-making power within a firm.
Corporate strategy	· Strategy concerned with what businesses a corporation does and does not wish to enter.
Decentralized organisation	· Decision-making authority is usually delegated to middle-level or lower-level management (often result in a flat structure).
Function	· A function (within a functional area) or business function is a group of processes for supporting a specific part of the mission of the enterprise. For example, accounts receivable and accounts payable are some of the business functions within the functional area, finance.
Functional area	· A group of related functions or organisational functional group such as finance, human resources, and marketing.
Functional strategy	· Strategy dealing with a functional area of the business enterprise.
Goals	· General statements about the direction in which a business enterprise intends to go.
Goal-setting	· Process of defining goals at various levels of the enterprise.

Informal organisation	· A network of personal interactions and relationships among employees (which are not shown by the organisation chart). This is often supported by an informal communication network called a grapevine, which carries gossip and other information throughout an organisation.
Intermediate goals	· Goals which have a planning horizon of one to five years.
Internal resources	· Matters inside an organisation that are important to future success. These could be physical resources such as machines, buildings, etc.; human resources, systems, and intangibles such as an organisation's image and knowhow.
Knowledge management	· The explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organizing, diffusion, use and exploitation. It requires turning personal knowledge into corporate knowledge that can be widely shared throughout an organisation and appropriately applied.
Level of a goal	· Classification of goals on the basis of the planning horizons.
Long-term goals	· Goals that extend over a period of five years or more into the future.
Mission	· A view of how an organisation will achieve its purpose.
Objectives	· Specific targets that a business enterprise intends to achieve by a given time.
Organisation chart	· A physical depiction of an organisation's formal structure showing employees titles and their relationship to one another.
Organisational analysis	· Internal scrutiny of the organisation for determining its strengths and weaknesses.
Organisational structure	· The specialization of the jobs to be done within an organisation and how these jobs relate to one another.

Plan	· A plan is the outcome of the planning process.
Planning	· Planning is the design of a desired future and of effective ways of bringing it about.
Planning horizon	· Period within which a goal is intended to be achieved.
Policy	· It represents an overall guide by setting up boundaries that provide general limits to managerial action and directions in which it will take place.
Procedure	· A detailed description of how to carry out the supporting work of a process.
Process	· A structured, measured set of business activities that are designed to produce a specified output for supporting a business function. It defines what to do together with prescribed inputs and outputs but it is independent of the organisational structure. The strong emphasis on input. Outputs prescribes a collaboration among business processes to achieve the organisational goals.
Purpose (of an organisation)	· A reason for the existence of the organisation.
Short-term goals	· Goals which have a planning horizon of less than, or up to, a year.
Strategic goals	· Long-term goals derived directly from the organisation's mission statement.
Strategic plan	· Document produced as an outcome of strategic planning giving details of the strategic objectives, goals, policies and other action programmes.
Strategy	· A means of achieving a desired end (objectives), generally concerned with the effective adaptation of an organisation to its environment through time.
Vision	· A mental image of a possible and desirable future state of the organisation.

2 PLANNING

INTRODUCTION

We learned in previous chapter that there are 4 processes involved in management process which are planning, organizing, directing and controlling. In general, an organization needs a strategic planning to direct itself in the development of procedures and operations to achieve the corporate goals and objectives. Through a strategic planning process, the values, current status, and environment of the organization are examined and these factors are related to the organizations desired future state.

2.1 PLANNING

- To organize, in a disciplined way, the major tasks that an enterprise has to address to maintain an operational efficiency in its existing business and to guide the organization into a better future.
- An analytical process which involves an assessment of the future, the determination of desired goals and objectives in the context of that future, the development of alternative courses of action to achieve such objectives and the selection of a course(s) of action among those alternatives.
- A response to the pessimistic belief that unless something is done a desired future state will not occur, and to the optimistic belief that we can do things to improve our chances of achieving the desired state.

A plan is the outcome of successful planning. It is a description of a consciously intended course of action. It may, however, be formally documented or remain informally in the planner's mind.

2.2 STRATEGY

- Presented as the policies whereby the organization elaborates its goals and objectives.
- Helps shape the organization while it moves towards its goals and objectives.
- Concerned with the choice of the particular market segments to be

served by the organization and the methods of achieving success in the particular segments. May define areas for product development, techniques for responding to competition, means of financing, size of the organization, and the image the enterprise should project.

Often the terms Strategy and Policy are confused with each other. What is the difference between strategy and policy?

STRATEGY	POLICY
• Concerned with meeting the threats and opportunities presented by the environment external to the organization. Important decisive moves that have an element of irreversibility in them. • Is necessary if an organization is to use its capital and human resources effectively and efficiently.	• A set of guidelines (behaviour standards) stated generally in the form: If X, then Y. • An elaboration of strategy so as to apply effectively internal resources and thereby achieve strategic objectives and goals. Whereas a policy is a guide to action, the strategy is the action itself.

Strategy is the outcome of the allocation of resources to areas that seem most beneficial. Often, divisions within an organization may compete with one another for capital resources. Each division presents legitimate proposals, but often there simply is not enough capital to meet all the competing internal demands. Strategy narrows the large number of possibilities available to the enterprise to a few, by choosing areas that appear to offer the greatest opportunities with limited resources.

Finally, strategy opens the door for the application of both managerial and production scale economies. That is, with a correct strategy, an organization can direct and use its human and capital resources effectively and efficiently in the market segments that appear most promising.

Strategies may be formulated at various levels in an organization. Like goal setting, many organizations have three levels of strategy: corporate, business and functional.

- Corporate strategy is concerned with what businesses a corporation does, and does not, wish to enter. It defines the businesses in which a

company will compete, preferably in a way that focuses resources to convert distinctive competence into competitive advantage.

- Business strategy is concerned with achieving the goals of a particular business within a corporation. It is the determination of how a company will compete in a given business, and position itself among its competitors. Strategic alternatives available for a business include the following.
  - Strong growth strategy may include sales growth, market share growth or growth in overall size. The basic approach in this strategy is to pump resources into the business for activities such as advertising and setting up new plants in an effort to spur new growth.
  - Slow growth is most appropriate for large businesses when rapid growth is impossible, and for small businesses in order to avoid too much strain on their operation.
  - Retrenchment strategy refers to cutting back some operations, and is appropriate when costs are out of control or when the market for a businesses' products is stagnant.
  - Finally, in the transformation strategy a business changes its mission to a vision and thereby its whole approach to business.

- Functional strategies deal with major aspects of the business's functional operations: marketing, production, finance, human resources and research and development (R&D).

2.3 STRATEGIC PLANNING

In layman definition, Strategic Planning is a process of analysing, figuring and determining where the organization intends to be in the long term, usually three or more years in the future. Often in our daily lives, we overlook on the organisations goals. The strategic planning process is the interaction among people involved in developing the plan. All the management members have to sit down and plan for the future; what to achieve and how to make it happen.

The strategic plan includes

- Details of the strategic goals,
- Objectives and policies, and
- The short-term steps or action programmes to ensure overall success

Strategic plan involves more than just plotting or writing the plan on the whiteboard or paper for that matter. The plans have to be carefully

analysed on the importance and the impact to the company and have to be accepted by all members. It includes ways to meet the organizations goals at all levels. Managers devote a great deal of hard work, attention and creativity to the formulation of strategic plans.

Effective strategic planning deals with two relevant dimensions:
1. responding to changes in the external environment, and
2. creatively deploying internal resources to improve the competitive position of the enterprise.

Organizations can survive in a hostile environment if they maintain a vigilant attitude towards external changes. Lack of alertness to changes in economic, competitive, social, political, technological, demographic and legal factors can become extremely detrimental for the sustained growth and profitability of the firm.

Strategic planning is the core capacity developed by organizations to adapt to environmental movements. This adaptability is not a purely passive response to external forces, but an active, creative and most decisive search for the conditions that can secure a profitable niche for the organizations business.

The internal response of an organization to environmental challenges is given as a clearly defined set of practical action programmes aimed at enhancing the existing and long-term position of the firm vis-to-vis its competitors. Since these action programmes define the totality of the major tasks the organization has to face, strategic planning is a valuable device for coordinating the efforts of the entire organization.

Thus, a strategic planning process should consider factors related to the external environment as well as internal business.

A top manager must have devoted some of his or her time to thinking about where the firm is going and what it will be doing in the years ahead; he or she is planning a strategy for the firm. Yet many managers give insufficient thought and time to this sort of activity; they perceive that the activity is of little importance. These managers may feel that way because every event that will happen needs not be foreseen and pondering something less certain is a waste of time. Many organizations today employ the method known as „Strategic Management‰ to evaluate the future implications of every organizational decision in advance of the implementation and set standards of performance beyond the time

horizon of the annual budget. In its strategic planning, the organization studies the changing patterns of the environment and incorporates the implications to these foreseeable changes into its strategic plan. This process, however, does not guarantee that the organization will never again be affected by adverse circumstances, but it does prepare it in advance through its forward-looking process.

Need for Strategic Planning

Strategic planning contributes to profits or service quality because of the following benefits:

- It is a communication process and so improves the coordination in every organization practising it. A formal strategic plan can be easily communicated as well as stored for security and future reference.
- It motivates managers. Establishment of long-range goals (described in the plan) gives an indication of the scope of the task to each senior manager, and shows what is expected of them for the organization to achieve its aims.
- It leads to better organizational decisions. The reason is it brings more factors into consideration, because managers are expected to evaluate the future implications of all decisions and because it insists on the consideration of possible choices.
- It provides a way of controlling a business. By providing a realistic model of future results, adjusting strategies to keep the organization on target becomes possible. It makes sure that resources are not wasted and that they become available as required.

These benefits are, however, not without costs both in the development and implementation of strategic plans. These costs include managers and outside planners (if any) time as well as the cost of collecting, maintaining and analysing relevant information. Often, the smaller organizations perceive these costs as prohibitive when compared with the benefits, and so tend to ignore formal strategic planning.

Strategic Plan

The outcome of the strategy planning process is a document called the strategic plan. Strategic plans are the mechanism for putting into effect strategic decisions. Strategic plans also reflect the contingencies of the business as defined by realistic business scenarios, and are articulated by the senior management. In general, a strategic plan should consist of the following four components:

(a) A definition of the desired future scope of the organization, including a statement of its business and what kind of company it is and it should be.
(b) A definition of the competitive advantage of the company, including its distinctive competence in relation to its competitors and the market niche it intends to occupy.
(c) A statement of mission, goals and objectives of the company and the measures used to evaluate performance.
(d) A statement of how resources that are needed to implement and execute the plan will be allocated.

Many organizations maintain a number of plans, each with a different planning horizon. For example, a multinational organizations overall strategic plan might consist of a long-range plan, a medium-range plan, and a short-range plan. The long-range plan is more like a vision and provides the direction and the objectives for the company to pursue in a rapidly changing environment. It has a planning horizon of ten years. The medium-range plan is intended to develop strategies to achieve the direction and objectives defined by the long-range plan, to provide guidelines for the short-range plan, and to ensure the optimum procurement and allocation of management resources. It has a planning horizon of three years. The short-range plan is the numerical expression of management activities within a defined operation time of one year or less.

Strategic Planning Process

There are three key tasks in developing an effective strategy:
(a) Identify a distinctive competence for the organization. A distinctive competence is something the organization does particularly well. It refers to the organizations unique resources and capabilities for conducting its business, and describes its strengths and its ability to overcome its weaknesses.
(b) Find a niche in the organizations environment. A niche is a social and economic situation for which the organization is well suited. An effective niche is one that positions the organization in such a way that it can take advantage of the opportunities that present themselves and avert threats from the environment.
(c) Find the best match between the organizations distinctive competencies and its available niches.

A popular method of business strategy planning, or strategy formulation, is known as SWOT (refer Figure 2.1) · strengths, weaknesses, opportunities and threats · analysis, or Strategic four-factor analysis.

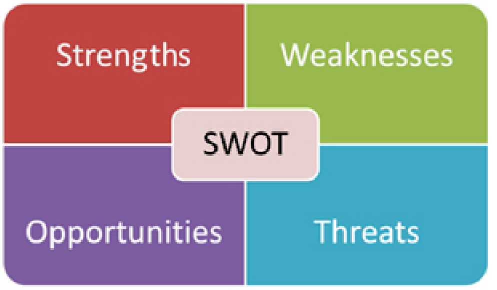


Figure 2.1: SWOT Analysis

It is a four-step process: setting strategic goals, organizational analysis, environmental analysis and formulation of business strategy, as shown in Figure 2.2.

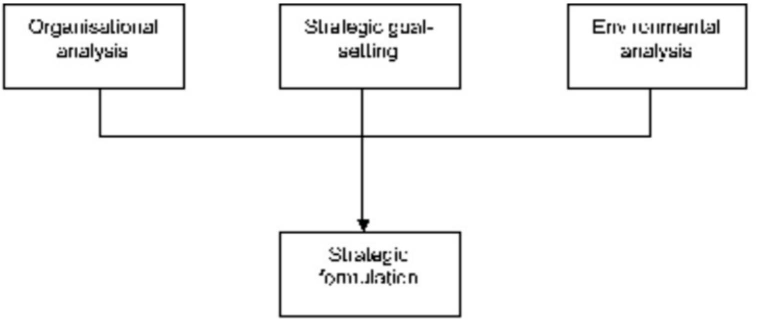


Figure 2.2: The process of SWOT analysis

STEP 1: Set Strategic Goals

Long-term goals derived directly from the organizations mission statement. These goals are often related to profitability, growth, market share, employment and diversification.

Prior to the formulation of strategy, you need to perform a thorough analysis regarding the current and future business position in terms of two dimensions:

– the non-controllable forces, which are associated with the external environment and which determine the industry trends and market opportunities;
– the internal competencies residing in your firm, which determine the unique competitive leadership potential that it could mobilize in order to establish business superiority against competitors.

STEP 2: Environmental Analysis

- This step involves scanning the environment for threats and opportunities.
- A threat is any unfavourable situation in your organizations environment. Threats may include new substitute products, new competitors, a decline in market share, new government regulations, imports, changing consumer tastes and preferences and hostile takeovers.
- An opportunity is any favourable situation in your organizations environment, and may be new markets or new product launching.
- You can use tools such as BCG business matrix (to be discussed in the next section) and industry attractiveness · business strength matrix · in performing the environmental analysis.

Table 2.1: Example opportunities and threats

Environmental Opportunities	Environmental Threats
• Expand core business • Exploit new market • Vertically integrate forward or backward • Provide services to other farmers • Enter new related businesses • Develop joint value-added ventures with other farmers • Direct marketing to consumers	• Likely entry of new large competitors • Slow market growth • Adverse government policies • Growing competitive pressures • Changing consumer tastes • New forms of competition • Downturn in economy • Rising labour costs • Rise in new products • Rise in clients bargaining power

STEP 3: Organizational Analysis

- This step is for planners to better understand their own company's strengths and weaknesses.
- A strength is a resource or capacity your organization can use effectively to achieve its objectives.
- A weakness is a limitation, fault or defect in the organization that will keep it from achieving its objectives.
- Strengths may include surplus cash, a dedicated work force, talented management, expertise or lack of competition.
- Absence of any of these strengths would represent a weakness.

Once the environmental and organizational analyses are over, the strategic planning process leads to the formulation of the strategy for

business. A business strategy consists of a set of well-coordinated action programmes and policies aimed at securing a long-term sustainable competitive advantage. These programmes are defined at two different levels of specificity: broad action programmes covering a multi-year planning horizon and specific action programmes covering a much shorter period (such as six to 18 months). Therefore, the business strategy is operationally expressed as a series of broad action programmes, and each one of these is in turn explicit as a set of action programmes. Often, the two levels of action programmes are documented in different documents as in Canon where the first level is covered in the medium-range plan and the second in the short-range plan.

STEP 4: Formulate Business Strategy

- This final step involves matching the environmental threats and opportunities with organizational strengths and weaknesses.
- The matching process is the most important part in strategy formulation.
- Organizations that do a good job of matching themselves with their environment are likely to succeed, but those that do a poor job will have considerably more trouble.
- Organizations should try to take advantage of market opportunities and neutralize adverse environmental impacts during consideration of environment in the matching process.
- Similarly, they should try to reinforce internal strengths and improve on perceived weaknesses with regard to competition during consideration of internal strengths and weaknesses in the matching.

After the strategy formulation is over, the next steps for completing the planning process are resource allocation and definition of performance measurements for management control, and budgeting for both strategic and operational commitments.

Strategic Planning Tools

Many different business-planning tools are in use. They may be classified into quantitative and qualitative tools. You may have studied many quantitative tools, such as forecasting methods, financial analyses, risk analysis, optimization and simulation, in other OUHK courses. They will, therefore, not be described here. Instead, we describe two of the more commonly used qualitative tools that are useful in the development of creative strategies: the famous Boston Consulting Group (BCG) business matrix (also known as the Market growth-market share matrix) and Porters competitive strategy framework. You may find other qualitative

tools described in B399, which you should refer to if you find the following two tools are not appropriate.

(a) Boston Consulting Group (BCG) Business Matrix

Boston Consulting Group (BCG) developed the concept of a matrix that portrays the strengths of the various products or activities of a firm having multiple products of varying strengths. The original purpose of this matrix was to help such firms decide which businesses should grow and which businesses should exit. It has, therefore, generally been used in corporate strategic decisions. However, the matrix is also used at the business level to help firms decide if they need different products within a given business. This use is more common in Hong Kong, as most organizations are businesses rather than corporations.

Let's explain the BCG business matrix in the way it is used for product portfolio analysis. Assume that there is a company with multiple product lines. Such companies have products at virtually every point in the product life cycle. For example, the management of a firm may use the BCG matrix to evaluate the market growth rate and relative market shares for each of their products.

High **Market Share**	CASH COW – Strong position in a low growth market – Little threat from competitors – Just keep the product ticking over and – Collect the cash	STAR – Attractive market so has to reinvest heavily – To defend market, share and grow – Little cash surplus
Low	DOG – Too small to benefit from economies of scale – Market does not justify further investment – Duvets	PROBLEM CHILD – Attractive market but too small to capitalized on it – Either invest heavily to gain market – Share or get out – Double or quit

When products are positioned in the matrix (Figure 2.2), they are classified according to the quadrant where they belong.

- Products in Cash cows generate cash flow for the firm, as they have a

relatively high market share (e.g. SPAM canned meat).

- Although products in the Stares quadrant have similar market share to the cash cows, they are strategically more important, as they see high market growth rate (e.g. Sony CD player). Cash generated by the cash cows may flow to support the growth of stars.
- Conversely, there must be something wrong with products lying in the Doges quadrant. These products need to be divested or liquidated.
- The most uncertain products are those in the Problem child region.

It is the managements responsibility to determine whether these products may become stars of tomorrow (if investment increases) or dogs to be divested. In developing marketing plans, managers must consider not only where the product is on the matrix but also in which direction it has been moving. A problem child (or question mark) product with increasing market share could be heading to become a star. One with decreasing market share is fading and may need major changes or elimination.

Examples of products that fall into the four categories of the BCG matrix can be readily identified. You may classify IBMs personal computers as stars for IBM, and 35mm photographic film a cash cow for Kodak. Kodak line of 35mm cameras is a problem child, and its discontinued disk camera was a dog.

The key for an organization in assessing its product mix is to seek balance and continuity. An organization with all its products as cash cows has a great present but a very doubtful future. One with only stars has limited funds for additional product development. It will also place great strain on its managements time, since stars require a lot of attention. An organization with mostly cash cows and stars, some problem children and a couple of unavoidable dogs would be said to have developed a strong product pipeline, and thus a balanced product mix.

How can you construct the BCG matrix? The market growth rate, which is plotted in the vertical axis of the matrix, is computed from historical data. For example, at the end of 2001 the market growth rate is measured as follows:

$$(\textit{Market growth rate})^{2001} = \frac{(\textit{Total market})^{2001} - (\textit{Total market})^{2000}}{(\textit{Total market})^{2000}} \times 100$$

On the horizontal axis, the market share of the product determines the position. However, computation of market share also requires careful consideration in order that it reflects the business strength in a competitive environment. For example, what would a 10% market share mean in a given business · strong or weak? In the US-based pharmaceutical industry, it might mean an extraordinarily strong position, but in the US automobile industry it would mean a very weak position. Thus, the relative market share should be used rather than the absolute, which is defined as follows:

$$(Relative\ market\ share)^{2001} = \frac{(Business\ sales)^{2001}}{(Leading\ competitors'\ sales')^{2001}}$$

For example, if San Miguel beer has a 40% share of the Hong Kong beer market and Heineken has a 20% share, then San Miguel's relative share is 2.0 (40/20) and Heinekens is 0.5 (20/40). Note that Relative market share is not expressed as a percentage. It shows the number of times the sales of a business enterprise exceed that of the most important competitor. Thus, a relative market shares of two will mean that business sales are twice the sales of the most important competitor, whereas a relative market share of 0.5 will mean that the business sales are only half as much as those of the leading competitor.

There are three basic insights a manager can gain from the BCG matrix.

1. First, the graphical matrix representation provides a powerful and compact visualization of the strengths of the firm's portfolio of businesses, or a whole business.
2. Second, it helps identify the capability for cash generation as well as the requirements of cash for each business.
3. Finally, because of the distinct characteristics of each business, it can suggest unique strategic directions.

(b) Porters Competitive Strategy Framework

The BCG matrix is a tool based on business portfolio analysis. This type of analysis relies heavily on the use of market share as a primary measure of competitive strength. We assume that

High market share → High accumulated value → Lower unit cost → High profitability.

That is, we believe that if the firm experiences a high market share, it is more likely that it will enjoy the highest profitability in the coming future. However, relying too much on this line of reasoning gives management the impression that to go after volume and market share is the only effective way to compete in the market. But, according to Porter, in the fight for market share, competition does not come only from the other players. Rather, competition in an industry is rooted in the underlying economic and competitive forces exerted from beyond the established combatants in a particular industry. Porter categorized the competitive forces shaping an industry in his five-force model of competitive strategy (refer to Figure 2.3).

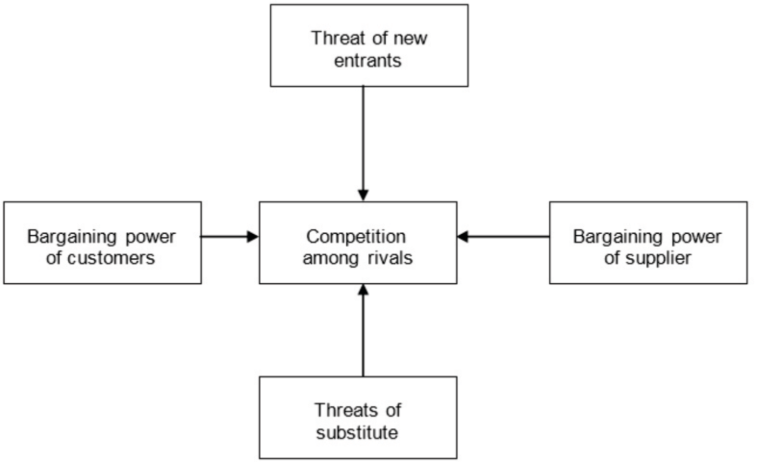


Figure 2.3: Porters five-force model

Porter shows in his framework that there are three potentially successful generic approaches for competing: overall cost leadership, differentiation, and focus.

- Cost leadership is perhaps the simplest of the three generic strategies. A firm has many avenues for pursuing this strategy, including economies of scale, using or developing new technology, and developing preferential access to raw materials. Each organization might have a different approach to realizing this strategy, but all successful cost-leaders offer a standard no-frills product and in so doing attempt to reap scale or absolute cost advantages from all sources. As a competitor, you may produce the same or even better quality at a lower cost than anyone else does. You may thus enjoy greater profits or · in a price war · stay in the market, profitably, with

reduced prices. Where competition has been sluggish, becoming a cost leader may revolutionize the entire business

- A differentiation strategy requires the organization to seek uniqueness in the eyes of the customers, which justifies their paying a premium price for the product. To enhance competitiveness, you need to develop a better or different product/service from your competitors. Quality imperatives demand a strategy equating the product with desirable quality standards. Differentiation can earn above average profits even in slow growth or declining markets.
- Last, the focus or niche strategy requires a narrow competitive scope. The organization focuses on a small target group and services this group or segment to the exclusion of others. You may focus on a section of the buying public, a segment of a product line, or an area of the geographic market. In other words, a niche in the market.

You should note here that both cost leadership and differentiation are simultaneously achievable and may be needed for sustained competitive advantage. Conditions of quality, innovation, commitment of users to products of rival firms, learning effects, economies of scale and economies of scope are some of the conditions for achieving both.

The Total Quality Management philosophy is based on the concept of achieving both low cost and differentiation through superior quality. This strategy has been used by Japanese firms in a number of industries such as consumer electronics. Xerox is an example of a US firm that has used quality as a way to achieve both low cost and differentiation.

As you have seen, a number of strategic planning tools are available that can help in assessing the external environment and the internal strengths and weaknesses of the organization. The BCG business matrix is a common tool for analysing the strengths and weaknesses of the firm's portfolio of businesses, or a whole business.

Porters competitive strategy framework is another powerful tool that analyses strategy suggesting a number of potentially successful generic strategies: cost leadership, differentiation, and focus.

2.4 FORMING STRATEGIES

Formulating a business strategy is not a science but rather an art. Rigid rules cannot be applied, and the best strategy does not emerge simply by using planning tools or applying some other techniques! A successful strategy instead depends on the correct reading of the signs on what the

future holds, combining them in the correct way, and thus producing a plan or direction for the future development of the organization. A successful strategy is an outcome of strategic planning, strategic thinking and opportunistic decision making.

In order to facilitate the search for a good strategy, many organizations have proposed a set of natural or generic strategies to be considered by each business depending on its position in the industry attractiveness and competitive strength dimensions. According to Porters competitive strategy framework, we can identify generic strategies such as differentiation of product and services, overall cost leadership, and market niche.

These generic strategies rely heavily on competitive advantage as the strategic theme. However, lately value for the customer is emerging as a new strategic theme. Today's company mission statements often clearly show this. For example, Peter Blackmore, an Executive Vice President in Compaq, said, Similarly, when CITIC Ka Wah Bank introduces Personal Instalment Loan (PIL) in 1999, it mentions,

An emerging generic strategy based on the value for customer theme is mass customization · tailor-making products for each individual customer, in which even the base components are varied (Westbrook and Williamson 1993). Some Japanese companies have recently initiated this strategy. Although this generic strategy seems simple enough, it requires the complex combination of excellence in marketing, engineering and logistics. It is a strategy that critically depends on a high degree of manufacturing competence, and at present it has been successful to varying degrees in some Japanese companies such as Melbo, which produces suits and National Panasonic Bicycles.

The outcome of the strategy formulation process is a strategic plan, which includes future scope of the organization, its competitive advantage, mission, strategic goals and objectives, and resources for its implementation.

Business strategy planning is a four-step process, called SWOT analysis, which is undertaken by the top management of an organization. These steps are:

Setting and modifying the organization's strategic goals.

↓

Scanning the environment for threats and opportunities.

↓

Analysing the organization for internal strengths and weaknesses.

↓

Matching environmental threats and opportunities with the organization's strengths and weaknesses.

The process is an iterative one, as you may need to modify the strategic goals as a result of the matching if required resources are not available.

You can make the search for a good strategy easier by basing your choice on a number of generic strategies as a starting point. These generic strategies could rely on a number of strategic themes such as market share, competitive advantage and value for the customer.

GLOSSARY

The glossary provides brief definitions or descriptions of the main technical terms you encountered in Unit 1.

Business functions are the basic building blocks of an enterprise and they must be present, regardless of what the organizational structure is. Business functions are usually grouped under different functional areas such as human resources, finance, marketing and MIS. Each business function consists of a group of business processes that are supported by their respective business procedures.

Business process	· A specific ordering of work activities across time and place, with a beginning, an end and clearly identified inputs and outputs · a structure for action.
Business strategy	· Strategy for achieving the goals of a particular business within a corporation.

Centralized organization	· Decision-making authority is usually tightly controlled by top management in an organization (often result in a tall structure).
Chain of command	· Reporting relationships within an organization; the flow of decision-making power within a firm.
Corporate strategy	· Strategy concerned with what businesses a corporation does and does not wish to enter.
Decentralized organization	· Decision-making authority is usually delegated to middlelevel or lower-level management (often result in a flat structure).
Environmental analysis	· Scanning the organizationÊs external environment for threats and opportunities.
External environment	· Factors affecting a firm that are essentially uncontrollable by the firm and that determine industry trends and market opportunities.
Function	· A function (within a functional area) or business function is a group of processes for supporting a specific part of the mission of the enterprise. For example, accounts receivable and accounts payable are some of the business functions within the functional area, finance.
Functional area	· A group of related functions or organizational functional group such as finance, human resources, and marketing.
Functional strategy	· Strategy dealing with a functional area of the business enterprise.
Goals	· General statements about the direction in which a business enterprise intends to go.
Goal-setting	· Process of defining goals at various levels of the enterprise.
Informal organization	· A network of personal interactions and relationships among employees (which are not shown by the organization chart). This is often supported by an informal communication network called a grapevine, which carries gossip and other information throughout an organization.

Information systems strategic planning	· A series of coordinated processes whereby an organization establishes a long-range plan of information technologybased application systems in order to achieve its objectives for supporting/enhancing the business mission, objectives and strategies of the organization.
Intermediate goals	· Goals which have a planning horizon of one to five years.
Internal resources	· Matters inside an organization that are important to future success. These could be physical resources such as machines, buildings, etc.; human resources, systems, and intangibles such as an organizationÊs image and know-how.
Knowledge management	· The explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organizing, diffusion, use and exploitation. It requires turning personal knowledge into corporate knowledge that can be widely shared throughout an organization and appropriately applied.
Level of a goal	· Classification of goals on the basis of the planning horizons.
Long-term goals	· Goals that extend over a period of five years or more into the future.
Mission	· A view of how an organization will achieve its purpose.
Objectives	· Specific targets that a business enterprise intends to achieve by a given time.
Organization chart	· A physical depiction of an organizationÊs formal structure showing employeeÊs titles and their relationship to one another.
Organizational analysis	· Internal scrutiny of the organization for determining its strengths and weaknesses.
Organizational structure	· The specialization of the jobs to be done within an organization and how these jobs relate to one another.
Plan	· A plan is the outcome of the planning process.

Planning	· Planning is the design of a desired future and of effective ways of bringing it about.
Planning horizon	· Period within which a goal is intended to be achieved.
Policy	· It represents an overall guide by setting up boundaries that provide general limits to managerial action and directions in which it will take place.
Procedure	· A detailed description of how to carry out the supporting work of a process.
Process	· A structured, measured set of business activities that are designed to produce a specified output for supporting a business function. It defines what to do together with prescribed inputs and outputs but it is independent of the organizational structure. The strong emphasis on input. Outputs prescribes a collaboration among business processes to achieve the organizational goals.
Purpose (of an organization)	· A reason for the existence of the organization.
Short-term goals	· Goals which have a planning horizon of less than, or up to, a year.
Strategic goals	· Long-term goals derived directly from the organizationÊs mission statement.
Strategic plan	· Document produced as an outcome of strategic planning giving details of the strategic objectives, goals, policies and other action programmes.
Strategic management	· A set of managerial decisions that relates the organization to its environment, guides internal activities and determines the long-term performance of the organization
Strategic planning	· Process by which strategic objectives, goals and policies evolve for a business enterprise.
Strategy	· A means of achieving a desired end (objectives), generally concerned with the effective adaptation of an organization to its environment through time.
Vision	· A mental image of a possible and desirable future state of the organization.

3 STRATEGIC USE OF INFORMATION TECHNOLOGY

INTRODUCTION

This chapter aims to describe how information technology (IT) affects organizations in general, and their strategies in particular.

In the 1970s, the convergence of computer and telecommunication technologies enabled organizations to consolidate a communication network among diverse geographical locations. In the 1980s, the powers of microcomputers and high-level languages for user-friendly software have enabled organizations to develop distributed processing environments. The next important issue in IT management is to transform IT into competitive advantage. Over the years, information systems developed to serve this purpose have become collectively known as strategic information systems (SIS).

Strategic information systems (SIS) enable a firm to gain a competitive edge or to undermine its rival's advantages. For instance, by building an online reservation system that links directly with travel agents, American Airlines enlarged its market share in the late 1960s. In contrast, those firms that cannot perceive the strategic visions of IT might risk losing their business opportunities. Delta Airlines, for example, lost US$86.7 million because it failed to anticipate the strategic use of IT.

We have to emphasize here that the advance of IT or IS alone does not necessarily produce strategic advantages that the management desires. As the successful deployment of SIS has to align with the corporate strategy, a good understanding of the relationship between IT and the methods of gaining competitive advantage is therefore essential.

Telecommunication networks and the information systems based on them play a very important role in gaining competitive advantage. Essentially they provide external links, such as those with customers and suppliers, through which information can be captured, processed,

analysed, delivered and stored. Thus, these information networks can have several strategic uses. One such important use is that these systems are capable of linking two or more organizations (rather than individuals) to build a tighter relationship, in which case they are called inter organizational systems (IOS).

Having understood the ways in which IT can be used to provide strategic advantage, you still need to know how and in what manner in order to identify specific applications of IT for a given organization. You, therefore, need to know how to use frameworks/models to assess the potential of IT in providing strategic advantage to any organization. As there are many of these tools, you need a framework to help you determine which tool to use and when.

3.1 INFORMATION SYSTEMS AND INFORMATION TECHNOLOGY

In order for information to flow from its source to an individual who can use it, some type of system, physical or otherwise, is required to collect, to store and then to move the information within an organization. Thus, an information system (IS) can be defined as a set of procedures that collects or retrieves, processes, stores and disseminates information to support organizational decision making and control. Many organizations have information systems which are entirely manual. Other systems are computer-based information systems that rely on information technology as well as humans for their operations. Information systems need not be necessarily computer-based, but often they are. The determining factor is whether an information system can be improved by including IT-based processing capability. If a manual system can perform a task efficiently and without error, there may be little reason to use IT. Often, however, as the volume of work grows, procedures increase in complexity or activities become more inter-related and/or dispersed geographically, information systems can improve their efficiency and effectiveness by obtaining IT to assist them. Therefore, all subsequent references to information systems in this course refer to these computer-based systems.

Information technology (IT) refers to a powerful collection of elements, which include computer hardware, software, telecommunication networks, and related technologies. As IT is the basis of any information system, there is often confusion between IS and IT. To clarify, information systems are applications having functionalities that can be exploited by the business, and information technology provides capabilities that enable these applications, as shown in Figure 3.1.

IS are the functionalities to be exploited by business IT provides the capabilities to enable IS applications

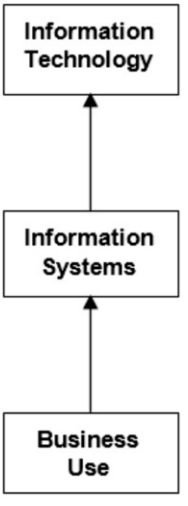


Figure 3.1: The role of IS and IT

For example, telecommunication is the technology that enables a computer to communicate with a remote terminal. This communication function could be used by an organization by placing these terminals at customer's sites thereby allowing customers to logon remotely to the organizations computer for a variety of purposes such as order entry or inquiring about order status. Here, information systems are the software applications that customers would use (including software packages on the customer's systems and the host computer) and information technology is the hardware supporting these applications (computers, communications devices and so on).

3.2 IS AND IT STRATEGIES

Because of the wide possibilities opened up by todays IT capabilities, IS functionalities and information use, business organizations are given every chance to determine what and how they wish to accomplish through IT. Organizations need to choose the appropriate IS and IT strategies to justify their IT investments and, at the same time, increase their competitive advantages.

Like business strategy, IS and IT strategies refer to the direction in which the organization develops it IS and IT. However, you should understand that the issue of what an organization should do with the technology is

termed IS strategy while the question of how it does it is termed IT strategy; or

- IS strategy is concerned primarily with aligning IS development with business needs and with seeking strategic advantage from it.
- IT strategy is concerned primarily with technology policies, and tackles questions of architecture, including risk attitudes, vendor policies and technical standards. In this context, IT architecture refers to the technology framework, which guides the organization in satisfying its business and management information system's needs.

You can see that IT architecture is the physical implementation of the IT strategy. It is the blueprint that defines the technical computing, information management and communications platform of the organization, the structures and controls that define how that platform can be used, and the categories of applications that can be created upon the platform. The IT architecture provides an overall picture of the range of technical options available to an organization, and as such, it also implies the range of business options. With such a definition, it is not surprising to find people referring to IT architecture as IS architecture. Both of the two terms imply the composite structure of:

- hardware and software that are used to manage information and communication;
- the tools used to access, package, deliver and communicate information;
- the standards, models and control framework; and
- the overall configuration that integrates the various components.

This is a fairly important and fundamental section, so let's summarize. We've been discussing the meanings of four special terms:

(1) Information systems (IS) are computer-based systems for collecting, retrieving, processing, storing and/or disseminating information to support organizational decision making and control.
(2) Information technology (IT) includes computer hardware, software, telecommunication networks, workstations, robotics and smart chips.
(3) IS strategy refers to what an organization should do with the technology,
(4) whereas the question of how they do it is IT strategy.

Number of issues that are related to the strategic use of IT. It starts with an introduction to the history of IT applications and management before it goes on to discuss strategic issues. We follow the same sequence in the next two sections · but a few retrospections first.

3.3 EVOLUTION OF INFORMATION SYSTEMS

The earliest information systems were developed in the early 1960s. Ever since its first appearance, the field of IS has been changing very significantly. ISs of today represent a totally different set of aims, means and responsibilities than were typically used in organizations of the 1970s, 1980s or even in the 1990s.

To analyse all those changes, researchers usually divide the short history of IS development into different eras and study how ISs evolved during the years. However, the division differs among researchers because they focus on different aspects. For example, Descants, Dickson and Price (2000) depict the IS history in five eras. You should study what happened in the very first era in the following reading.

Centralization Era

This era is dominated by information systems that function primarily as the processing of predefined (business) transactions to produce fixed-format reports on schedule. Their principal use is to automate the basic business processes under the supervision of the organization. Typical transactions handled by these systems are payroll records, customer orders and purchase orders. To help management, these systems could also provide predefined exception reports based on the transactions processed. Many such systems process transaction data of the organizations; they are called transaction processing systems or data processing systems. It also explains why this era is sometimes called the data processing (DP) era. Technologically speaking, the era is marked by the development of direct access storage devices (DASD) and database management systems (DBMS).

Another type of application developed in this era is management information systems (MISs). They provide two new capabilities to the users:

1. enquiry, i.e. flexible data base access initiated by ad hoc user requests (for searching an item of information); and
2. analysis, i.e. flexible user-driven processing (such as generating what if scenarios for testing implications of planning models).

These capabilities were mainly useful for managers and professionals in satisfying their information needs.

This was a period of rapid growth · the main objective was to replace the manual systems with the automated ones. Opportunities for developing new ISs were identified by inspection, by observing the performance of routine tasks and concluding that computers could be programmed to perform them. With experience, systems were also developed in other areas such as manufacturing, marketing and purchasing. However, development of such systems was so expensive that the efforts were usually centralized under managements control.

DP systems and MISs were adequate when the environmental challenge was to deploy the newly arrived information (mainly computer) technology to automate manual operations, and to develop efficient applications that could reduce or avoid organizational costs. But these systems, apart from processing the transaction data, did not meet the information needs of managers and professionals as organizations began to flatten and globalization began to take shape in the late 1970s.

Decentralization Era

It was the emergence of personal computers and low-cost software around 1980 that opened the era of decentralization. People with abundant supplies of user-friendly software tools found themselves able to develop applications (small information systems) for their own use even without the leadership of skilful technicians or formal methodologies for software development. This was the beginning of end-user computing. The control of development and application was decentralized to individual managers who were able to solve their ad hoc problems by building simple but useful software solutions with little effort on their PCs or mainframes, thereby avoiding the long backlog of requests to the MIS department.

The MISs in the earlier period evolved to add new light to information business management. MISs in the 1908s depended primarily on time-sharing and on powerful microcomputer technology. Common users for MIS were managers and professionals rather than the clerical and supervisory level staff. These systems were aimed at supporting the managers and professionals, rather than replacing them by automating their tasks. A new breed of MISs supporting specific decisions came to be known as decision support systems (DSS). These systems were not simply to provide higher quality information from the use of decision models and

databases, rather they were meant to improve the quality of the managerial decision process itself. Similarly, other systems that were specifically designed for top management (executives) were called executive information systems (EIS). Nowadays, EIS are being introduced at an increasing rate. Many organizations in Hong Kong such as Hospital Authority, Hong Kong University, HALT and HSBC have them helping the senior management in various functions (e.g. budgeting). There are two reasons for this worldwide growth of EIS. Firstly, modern IT makes these systems both more powerful and more palatable than the old paper-based MIS. Secondly, the accelerating pace of business and the simultaneous need to make organizations more flexible by reducing layers of management is met by EIS.

Architecture Era

The continued proliferation of PC and communications technologies, including the Internet technology in the period 1985 to 1996, offered corporations a chance to readjust the role played by their IT. This was the time when many saw the importance of so-called strategic information systems (SISs). They are systems capable of supporting or shaping the competitive strategy of the organization. Frequently, the accomplishment of SISs extends beyond the bounds of the organization itself, to its customers or clients, suppliers and competitors. Making use of communications technologies, SISs were often large information systems connecting business partners and various functions of the organization to a large-scale database. They were central to the IS architecture of the organization, which was how the era got its name.

In the early years of this era, SIS might have just been a management information system (MIS). It was distinguished from the other MISs in the way that it directly supported or shaped the competitive strategy of the organization. With the introduction of business process re-engineering (BPR), management started to realize that simply focusing on the strategic advantages brought about by an MIS was not sufficient. Organizations needed to analyse their strategic needs before investing in the design of an SIS. You should now study the text to find how IT and IS evolved during this period.

You must have noticed the term enterprise resource planning (ERP) in the reading. This type of system could be implemented on a mainframe or in a distributed network, and were regarded as a strategic tool by many organizations. You can see some of the major functions of an ERP system in Figure 3.2.

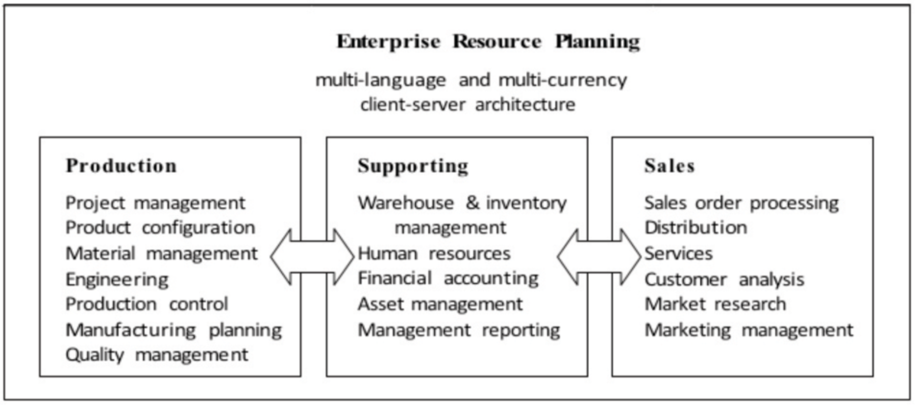


Figure 3.2: ERP

Internet Era

Internet, a global network that connects other computer networks, together with software and protocols for controlling the movement of data. The Internet, often referred to as 'the Net', stems from a network called ARAPNET (Advanced Research Project Agency Network), which was initiated in 1969 by a group of universities and private research groups funded by the US Department of Defence. It now covers almost every country in the world. Its organization is informal and deliberately non-political--its controllers tend to concentrate on technical aspects rather than on administrative control.

The connection of computers can form a network; this connection may be direct (by direct cabling) or indirect (dial-up). The benefit of connecting computers can exchange information and share resources such as application software, printers, files, databases or even other networks

The interconnection of networks among the world forms a dynamic international network system, which a group of computers, paths or networks may suddenly disappear or appear. However, different networks may use different transmission methods or protocols, so a gateway should be needed in order to connect two different networks together.

The Web, as the Internet is often called, originated as a communication network among universities and research laboratories. It remained for a long time as a convenient means for email, file transfer, discussion group, telnet, etc. until the graphical user-friendly browser, Netscape, appeared in the market. The Internet is accessible for anyone, no matter whether they use a PC or a mainframe. A new kind of business, the Internet Service

Provider (ISP) emerged and has helped millions of people surf on the Web.

The Internet offers users a number of basic services including data transfer, electronic mail, and the ability to access information in remote databases. A notable feature is the existence of user groups, which allow people to exchange information and debate specific subjects of interest. In addition, there are a number of high-level services. For example, MBONE (multicast backbone service) allows the transmission of messages to more than one destination. It is used in videoconferencing.

While many businesses were still looking at the Internet as a playground for children's games, success stories of many online companies (e.g. Amazon.com) were finding their way into magazines and textbooks. The Internet era was transformed into an era of electronic commerce. Suddenly people saw new threats and opportunities on the Web. You can read some of the happenings during the Internet era from the following paragraphs.

A much more detailed discussion on the strategic issues of the Internet will be left to the latter half of this course. By now, we should be satisfied with being able to identify the five eras of IT/IS development and deployment.

Let's re-emphasize here that these eras do not actually represent sequential relationships in time; i.e. it is not that the era of centralization ended when the era of decentralization started. In fact, an era derives its name from the state-of-the-art IT systems available at that time. As such, during the decentralization era, decentralized ISs were the state-of-the-art but still some (rather many) organizations continued to use centralized IS and thereby stayed in the centralization era. Similarly, even now in the Internet era, there are many organizations which are still in the architecture, or even in the centralization, era!

Note that many of the information systems that we use today are SISs that first appeared in the architecture era. These systems have three essential characteristics:

(a) They significantly change the business performance of the firm;
(b) They contribute to attaining a strategic goal; and
(c) They fundamentally change the way the company does business or the way it competes.

SISs are of particular importance, as their deployment is related to whether the strategic goal of the firm can be achieved. An SIS may be either a data processing system or a management information system (or management support system). The dimension that makes a system strategic is that it directly supports or shapes the competitive strategy of the organization.

3.4 IT AS A STRATEGIC RESOURCE

In the last decade or so, the role of IT within organizations has changed significantly as more and more organizations have built and used SISs. Many organizations have recognized that IT offers the capability to redefine the boundaries of markets and structural characteristics, alter the fundamental rules and basis of competition, redefine business scope, and provide a new set of competitive weapons. It is, therefore, imperative that the traditional role definition of IT needs to be changed to reflect a more central, strategic role for IT within management. This emerging new role of IT within organizations is the result of two concurrent and perhaps equally powerful forces · technology push and competitive pull · as shown in Figure 3.3.



Figure 3.3: The forces on IT as a strategic resource

The technology push force has emerged partly due to significant improvement in the price-performance ratio of IT and partly due to increased connectivity capabilities over time. The other force, competitive pull has emerged because markets are becoming highly competitive and the traditional sources of competitive advantages are diminishing as competitors strive to attain parity with one another.

Often there is a need to distinguish between strategic use of information and strategic use of information technology. Some organizations have used IT to achieve strategic objectives taking advantage of technological advances. For example, suppose an organization determines that relations with its customers could be strengthened by placing computer terminals in each customer location facilitating order placement, as well

as providing a means of advance price and availability checking. While this information was previously made available to customers by phone on request, it is now provided instantly via telecommunication links. Customers are thereby tied into the firm in a way that makes it more difficult for them to change suppliers. In this case, it is the information technology and not the information itself (since the same information was available previously), which is the key factor in achieving improved customer relations (and thus meeting the firm's strategic objective).

On the other hand, many organizations use information itself, rather than IT, as a strategic resource. For instance, an organization might have a strategy of expansion through acquisition of related businesses. Having identified criteria for evaluating potential acquisition, the organization now scans a commercial database to identify acquisition prospects that meet the criteria. In doing so, they are using new information or using available information in new ways to widen the range of firms that are considered and to make better strategic acquisition choices. In this case, therefore, it is the use of important new information or of available information in new ways that is the key to success. Although IT facilitates the processing of this information, it is not the technology itself (as in the earlier case) that provides the strategic advantage.

The primary distinction between these two approaches lies in the source of the value added. In the first example, the introduction of IT increased the value of existing information by providing easier and faster access. In the second, the information itself provided a strategic advantage through the new uses to which it is put.

In some situations, both IT and information can be used as a strategic resource. For example, an airline (such as American Airlines) had already pursued the use of IT by putting computer reservation terminals into travel agencies. Then it began to use the detailed information that it thereby obtained on supply and demand for various routes to manage optimally the availability of low-price seats on each of its flights. This ensures that it will capture much of the business travellers demand for high-priced unrestricted tickets as well as fill otherwise-empty seats with low-priced tickets that are sold with restrictions of timing, penalties for changing reservations and so on. (Airlines now call this strategy yield management.) Thus, the airline used both IT and information for getting strategic advantage.

3.5 IT AND COMPETITIVE STRATEGY

Competition, while ubiquitous, always occurs within certain boundaries which may be called competitive arenas (Wiseman 1988). Individuals as well as organizations compete in a variety of arenas. Within the same arena, such as an industry, a competitor may win one competitive battle and lose another. To explain the victory of one adversary over another in a competitive battle, you need to know those factors responsible for its win at the time. On the other hand, to explain the dominance of one competitor over another in an arena, you need to know those factors conducive to its success over a period of time. In this case, you need to understand those powers, consisting of certain abilities or combination of abilities, that the superior performer possesses uniquely or to a greater degree than any of the competitors. Such powers are called competitive advantages. For example, in Hong Kong, large supermarket chains such as Park'N Shop or Wellcome obtain goods from suppliers at lower cost than their smaller rivals, and they offer these goods to customers at prices competitors may not be able to match. The chain thus enjoys advantages in two arenas:

(a) It is able to negotiate price concessions from suppliers because the volume of its purchases yields substantial bargaining power, and
(b) It is able to set lower retail prices compared to its rivals because of its reduced purchasing costs.

In most cases, a competitive advantage results directly from an explicit strategy, that is, the conscious choice or action designed to achieve an edge, which is called the individuals or organizations competitive strategy. The process of strategic management, formulating and implementing organizational strategy, is progressively being defined as the management of competitive advantage. According to Porter, the essence of formulating competitive strategy is relating an organization to its environment. Although the relevant environment is very broad, encompassing social as well as economic forces, the key aspect of the organizations environment is the industry or industries in which it competes. Industry structure has a strong influence in determining the competitive rules of the game as well as the strategy potentially available to the firm. The essence of strategic formulation is coping with competition.

According to Porters five-force model, the impact of IT can be addressed on the basis of the five forces. Table 3.1 below summarizes the

opportunities and risks that IT may be employed to shape organizational strategies.

Table 3.1: Impacts of IT on Organizational Strategies

	Opportunities	Risks
New entrant	To build barriers	To lower entry barriers
Customers	To build in switching costs	To increase customers power
Rivalry	To change basis of competition	To change basis of competition
Suppliers	To change the balance of power	To increase suppliers power
Substitutes	To generate new products	To generate new products

let's summarize. IT exerts a strong influence on organizations. It changes the way work is done, whether it is production, coordination or managerial work. It integrates business functions at all levels and gives rise to organizational teams, electronic alliances and electronic markets. It permits a high degree of simultaneous collaboration and competition in the industry. It presents new strategic opportunities and changes organizational structure. It, therefore, poses a major challenge for management today to catalyse the necessary transformation of their organization.

3.6 COMPETITIVE ADVANTAGE AND COMPETITIVE NECESSITY

Organizations are using IT as a competitive tool in two ways: one, as competitive necessity, i.e. to stay in the business or maintain competition, and the other, to gain competitive advantage or beat the other competitors. Indeed, IT has become the basis for competing in more and more industries. For example, airlines, hotels, and rental car companies cannot survive without an online reservation system, either their own or someone else's. In the drug and hospital wholesaling industries, those with an automated order entry and distribution system have a definite advantage over those without these systems. In financial markets, IT-based trading and settlement systems are taking over old open systems. In manufacturing, CAD/CAM and engineering, and increasingly electronic data interchange (EDI) are becoming mandatory to compete. Similar developments are taking place in many other industries. As industry leaders increasingly turn to IT to address quality, service, innovation and speed, their competitors must do the same, or find themselves at a disadvantage.

In a few cases, the leaders have such a head start that competitors had to form alliances to stay in the competition. For example, European airlines formed alliances such as Galileo and Amadeus to build global online reservation systems. None of the airlines could have afforded to develop their own reservation system and yet they feared that American Airlines or United Airlines would capture the deregulated European market if they did not have a comparable system. Similarly, many smaller banks in Hong Kong had to build their own alliances to set up an ATM network, JETCO, in order to compete with larger banks like HSBC.

An interesting example of this staying abreast or losing out principle can be given from the trucking industry in USA. Conventionally, the American trucking industry shipped two types of truckloads of goods: full truckloads point-to-point and less than truckloads. But when United Parcel Service (UPS) based its entire business on less than truckload delivery, it created a new industry segment: package delivery. As a result, the trucking industry changed, and UPS actually became much larger than the other trucking companies because of a bigger market. The new technology UPS used for its success was efficient package sorting at distribution centres to maximize use of the trucks. Other competitors were forced to switch over to this technology, and those who could not or did not were not able to withstand the competition.

There was, however, a weakness in UPSs service, as it did not guarantee a delivery time nor track packages. Federal Express capitalized on this weakness and added two more functions: guaranteed delivery time and package tracking. It became larger than UPS because it created yet another industry segment: overnight delivery, and tapped an even larger market. The new technology it used was a new system for tracking packages. Again, its competitors were forced to invest in the new technology to maintain competition.

Switching from one technology to another requires substantial investments, but that decision must be often made to remain competitive. A firm that correctly identifies a new market and the technologies to exploit it maintains a competitive advantage. However, management sometimes has such an emotional attachment to the existing technology that it fails to see the new one and loses its market share to swifter competitors.

However, competitive and technological forces simply do not permit any

single organization to enjoy a sustainable competitive advantage merely from its use of IT. A sustainable advantage is one that makes its possessor immune from attack by competitors attempting to duplicate, emulate or copy it. For example, HSBC was one of the first banks in Hong Kong to provide its customers with access to any three accounts through their ATMs and move funds between them. Soon, most banks in Hong Kong replicated the technology and were able to provide similar facilities. Similarly, in the case of overnight package delivery business, Federal Express is not the only courier now giving this service as many others such as DHL are giving similar facilities.

It will, however, be possible for an organization, which has been an early mover with a business benefit enabled by IT, to actively invest in innovations that continue to increase the benefits to the user of innovation. In other words, the benefits do not flow from the mere use of IT, but arise from the human, organizational and IT application innovations that are added on to the original business benefit. IT is merely an enabler that offers an organization the opportunity (in the form of an SIS) to vigorously invest in added innovations if it wishes to stay ahead of its competitors. For example, Federal Express has now gone beyond overnight delivery. It handles inventory for its large corporate clients and guarantees overnight delivery of these inventoried items using its distribution network and SIS. Thus, clients can outsource not only their inventory but also distribution to Federal Express. Such clients could be parts suppliers, manufacturers, distributors and retailers.

3.7 INFORMATION PARTNERSHIPS

IT empowers organizations to compete, ironically, by providing new ways of cooperating. A common example of this is information partnership, facilitated by the sharing of customer data. Through such a partnership, diverse companies can offer novel incentives and services or participate in joint marketing programmes. An example of this type of partnership exists among HSBC and many retail stores such as Dragon Seed and Chinese Arts and Crafts. In all these cases, HSBC issues special VISA cards that are customized for use in a particular store. These cards are available to existing HSBC VISA card holders at no extra cost, and the holders of such cards get several privileges from the stores such as receiving special discounts, gifts, marketing brochures and catalogues. This is achieved by sharing the database of special cardholders with the store, as a result of which the store gets more marketing opportunities and more sales, and the bank gets more sales using the special cards. Thus, through this type

of partnership, organizations can take advantage of new channels of distribution or introduce operational efficiencies and revenue enhancements.

Partnerships create opportunities for scale and cross selling. They can make small companies look, feel, and act big, reaching for customers once beyond their grasp. Partnerships can also make big companies look small and close, targeting and servicing custom markets. In short, partnerships provide a new basis for differentiation.

3.8 IOS AND COMPETITIVE ADVANTAGE

The proliferation of IOS suggests that many organizations are finding it to be an important source of competitive advantage. The competitive advantage stems fundamentally from two factors:

(a) comparative efficiency, which allows an organization to produce its products or services more cheaply than its competitors; and
(b) bargaining power, which allows a firm to resolve bargaining situations with its customers and suppliers to its own advantage. The strength of these factors is determined by even more fundamental issues, comparative efficiency by both internal efficiency (as in lower inventory costs by allowing just-in-time), and inter-organizational efficiency (as in allowing customers to shop and check order status electronically, without tying up customer service representatives). Similarly, bargaining power could be by unique product features (such as by making products easier or less expensive to select, order, handle, use or account for), by switching costs or by search-related costs (as in lower cost of shopping via links to suppliers). These generic uses of IOS help in locating attractive opportunities for new IOS.

In summary, we see that IOSs are developed, operated, and/or used jointly by two or more organizations. IOS either do routine transaction processing, or provide no routine task-support for managerial, analytic and design functions. These systems are applied either in:

(a) electronic hierarchies; or
(b) electronic markets. Cooperative use of IOS can also be made, as in information partnerships, which is facilitated by the sharing of customer data. An IOS may provide competitive advantage either from its comparative efficiency or from its bargaining power.

3.9 OPPORTUNITIES FOR STRATEGIC IT APPLICATION

Achieving competitive advantages requires broad IT management and user dialogue plus imagination. The process is complicated by the fact that many IT products may be strategic (SIS) though the potential benefits may be very subjective and not easily verified. The ever-changing business environment adds to the difficulties of the management that are in charge of strategic use of IT. Your next reading will help you understand the modern view of value creation and IT.

The authors first outline a simple model of value creation and go on to describe each of three components of the model · information assimilation, collaboration, and methodology · in detail. You should realize the supporting role of IT in each of these components. In the section on The Shift to Value Creation, the authors explain that value can only be created on the basis of a sufficient intellectual bandwidth. After reading the article, you should know that competitive advantages (i.e. values) are not always guaranteed even if an organization invests in the most advanced state-of-the-art IT. To convert IT investment to strategic advantage, an organization needs to re-consider how each of the components contributes to value creation and how they can be brought together to become mass configuration.

Therefore, some analytical frameworks are needed which could stimulate business strategic thinking and analysis to generate ideas for determining potential areas for SIS development. These frameworks are based on a number of aspects related to organizational strategy, which could be used to link ITs role in realizing the strategy. Five of the best known frameworks are discussed below.

3.10 STRATEGIC GRID

IT plays very different roles in different industry settings. Sometimes it has played a predominantly operational role, while at other times its impact has been primarily on accounting or marketing. In many of these settings, industry leaders have been so aggressive that they have transformed the rules of competition, putting those who followed under great pressure. To identify the role of IT in an organization, McFarlan and McKenney have provided a Strategic grid framework, which can help to position an organization appropriately (see Figure 3.3).

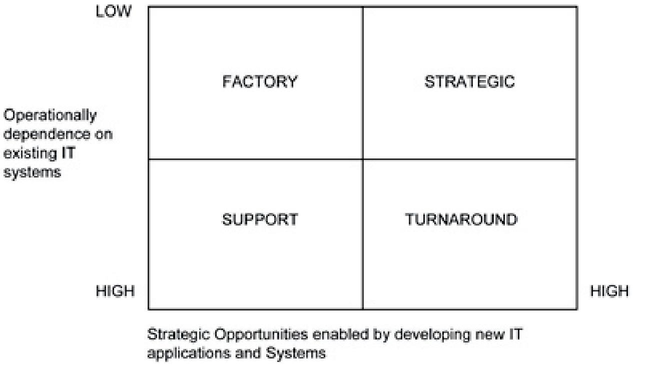


Figure 3.3: McFarland-McKenny's Strategy Grid

At the beginning of an analysis, specific IT applications or business units are positioned within different quadrants on the strategic grid. Let's explain the two axes in Figure 3.3. By Operational dependence we mean to measure the negative consequence resulted as a failure of an existing IT application; while we mean to measure the competitive advantages or new opportunities created if a new IT system is developed. The grid can be used to position the strategic advantages that an organization can get from its IT applications · typical examples are as follows.

- Strategic · banking business
- Factory · mining industry
- Support · paper manufacturing
- Turnaround · retailing

Moreover, the grid can also be used to evaluate IT portfolios and IT development plans. IT applications in each of the four quadrants bear certain specific characteristics.

- Strategic · these systems are designed to make the business stand out from its competitors. They may be involved the latest technologies that are complex, expensive and may be error-prone. The systems are highly profitable when their success sustains them, but when they fail one day, they'll become a very costly lesson to the firm.
- Factory · these systems are what an organization is relying on in its daily operation of business and customer services. Many are centralized systems that have been developed in a Top down manner. Management is concerned with how to maintain the effectiveness of these systems.
- Support · they are usually systems that handle routine administrative

tasks such as accounting and personnel. Many of them can be standard packages that are easily available in the market. These systems bear the lowest level of risk, however, but their acquisition and operation should by no means receive less surveillance.

- Turnaround · these are usually implementations of new concepts, perhaps resulting from a R&D proposal. Their performance is now being monitored because if they are successful they will become Strategic systems for the organization. Before their success is guaranteed, the organization should not be laying too many hopes on them and a ceiling of financial investment should be set at the start of their development plan.

As a positioning framework, the strategic grid is particularly useful for assessing the strategic importance of IT to an organization or a business unit. By questioning the past and future importance of IT, the framework helps management understand not only the scale of importance of IT but the likely organizational dynamics involved in managing IT appropriately. The strategic grid is also useful for evaluating a portfolio of alternative IT investments, in relating their impact on business strategy. You can also use it as a basis for the formulation of IS strategy.

3.11 COMPETITIVE FORCE ANALYSIS

This analysis is based on Porters competitive forces analysis and competitive strategy framework, which you studied in topic 2. Recall what you learned in topic 2· while Porter proposed his five-force model, he emphasized three generic strategies for achieving above-average performance in an industry · low cost, differentiation and niche/focus strategy · which you have already studied in topic 2. The concept of generic strategies is based on the notion that competitive advantage is the goal of any strategy, and to achieve competitive advantage a firm must define the type of competitive advantage it seeks to attain and the scope within which it will attain it.

IT can affect:
(a) the products and services,
(b) markets, and
(c) economics of production.

Competitive applications of IT onto Porters competitive forces model and proposed five questions for assessing the strategic impact of IT on a firm. If the answer to a particular question is Yes, a strategic opportunity exists

that requires the attention of top management. The five questions, with Porters competitive forces noted in parentheses, are:

- Can IT be used to build barriers against new entrants? (threat of new entrants)
- Can IT be used to build in switching costs, i.e., increase customer reliance on our systems? (buyers)
- Can IT change the basis of competition? (industry competitors)
- Can IT change the balance of power in supplier relationships? (suppliers)
- Can IT be used to generate new products? (substitutes)

The higher the number of questions management answers with yes, the higher the potential of Strategic Information System in the organization.

3.12 VALUE CHAIN ANALYSIS

You cannot identify competitive advantage by looking at the enterprise as a whole. You have to derive competitive advantage from one or more of the discrete activities that your firm performs, such as designing, manufacturing, marketing, delivering or supporting its product. Therefore, you need to develop a systematic way of analysing and evaluating this process of creating goods or services. This process is the value chain, a generic model for business activity analysis.

Notice that the value chain represents the inter-relationship between all value activities in a firm. Porter argues that there are two classes of activity · primary activities and support activities · both of which contribute to the value of the product or service offered. These two classes of activities roughly correspond to the technological and socio-economical activities.

The model is also known as the Value added model as the activities identified in the model are supposed to add value to the product or service. To increase its competitive advantage, a firm is therefore keen on optimizing the value added at each activity; i.e. it should be able to add value at a lower cost and in a more effective way in some of the activities better than its competitors.

Using the value chain model for analysis, you need to identify and isolate each activity. The linkage of activities should also be identified so that a firm can try improving process (and information) flows not only to enhance coordination, but also to the optimization of the value added activities related.

The value chain of a firm should not be considered as an isolated structure as each supplier has its own value chain and so have the buyers. The contact points of two value chains always indicate an activity which, if done better, could enhance the competitive advantage of both parties.

By studying how your firm performs primary and support activities for each product, you can see where it emphasizes a specific competitive strategy. Then the firm can decide which strategies it wants to stress and realign its activities accordingly.

Value chain analysis can even include studying the value chain of a supplier or buyer to discover, for example, if there is an opportunity for vertical integration. Competitive advantage in either cost or differentiation can be considered as a function of a company's value chain. The cost position of a company is a reflection of the collective cost of performing all its value activities in relation to its competitors. The ability of a company to differentiate itself is a reflection of the contribution of each value activity toward fulfilment of the buyer's needs. Not only the primary activities contribute to differentiation but also the support activities. The buyer's satisfaction depends on both the impact of the product or service on his needs and on the company's other activities.

3.13 SUPPLY CHAIN MANAGEMENT

A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers. Supply chains exist in both service and manufacturing organizations, although the complexity of the chain may vary greatly from industry to industry and firm to firm.

Supply chain management is typically viewed to lie between fully vertically integrated firms, where the entire material flow is owned by a single firm and those where each channel member operates independently. Therefore, coordination between the various players in the chain is key in its effective management. Supply chain management a well-balanced and well-practiced relay team. Such a team is more competitive when each player knows how to be positioned for the hand-off. The relationships are the strongest between players who directly pass the baton (stick), but the entire team needs to make a coordinated effort to win the race.

Below is an example (Figure 3.4) of a very simple supply chain for a single product, where raw material is procured from vendors, transformed into finished goods in a single step, and then transported to distribution centres, and ultimately, customers. Realistic supply chains have multiple end products with shared components, facilities and capacities. The flow of materials is not always along an arborescent network, various modes of transportation may be considered, and the bill of materials for the end items may be both deep and large.

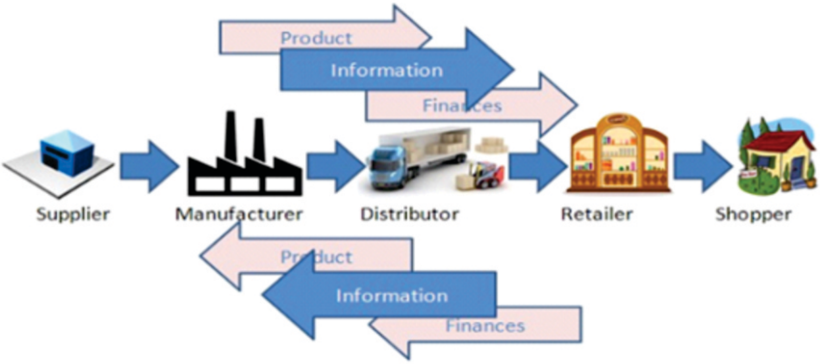


Figure 3.4: SCM Process

To simplify the concept, supply chain management can be defined as a loop: it starts with the customer and ends with the customer. All materials, finished products, information, and even all transactions flow through the loop. However, supply chain management can be a very difficult task because in the reality, the supply chain is a complex and dynamic network of facilities and organizations with different, conflicting objectives.

Supply chains exist in both service and manufacturing organizations, although the complexity of the chain may vary greatly from industry to industry and firm to firm.

Unlike commercial manufacturing supplies, services such as clinical supplies planning are very dynamic and can often have last minute changes. Availability of patient kit when patient arrives at investigator site is very important for clinical trial success. This results in overproduction of drug products to take care of last minute change in demand. R&D manufacturing is very expensive and overproduction of patient kits adds significant cost to the total cost of clinical trials. An integrated supply chain can reduce the overproduction of drug products by efficient demand management, planning, and inventory management.

Traditionally, marketing, distribution, planning, manufacturing, and the purchasing organizations along the supply chain operated independently. These organizations have their own objectives and these are often conflicting. Marketing's objective of high customer service and maximum sales dollars' conflict with manufacturing and distribution goals. Many manufacturing operations are designed to maximize throughput and lower costs with little consideration for the impact on inventory levels and distribution capabilities. Purchasing contracts are often negotiated with very little information beyond historical buying patterns. The result of these factors is that there is not a single, integrated plan for the organization---there were as many plans as businesses. Clearly, there is a need for a mechanism through which these different functions can be integrated together. Supply chain management is a strategy through which such integration can be achieved.

3.14 CUSTOMER'S RESOURCE LIFE CYCLE ANALYSIS

This model, in the context of Porters competitive force model, focuses on a single relationship, that is, the relationship between the provider of goods or services and the customer. The developers of this framework, this is where the primary strategy of an organization evolves.

In this approach, a firm looks at its products and services from the customer's viewpoint. Thus, the focus here is on How can we use IT to help our customers more easily acquire our product and then get more value out of it? The answer to this question should be based not only on direct customers but also on indirect customers (e.g. consumers). This analysis is described in the following reading.

From the customer's point of view, the life of a product can be divided into four phases:

- Determine need.
- Acquire product.
- Manage its use.
- Dispose of product.

Within these four general phases are 13 stages, which together constitute the customer resource life cycle. The stages are:

Determine Need	
1. Establish requirements.	An SIS can explain product(s) to customers to help them assess their requirements.
2. Determine characteristics of product needed.	An SIS can help customers choose product features and then configure a product for them.
Acquire Product	
3. Locate supplier.	An SIS from an intermediary, like publishers of guides, may be useful.
4. Order product.	Many SIS provide this service, such as airline reservation systems, American Hospital Supply's ASAP system, etc.
5. Authorize and pay for product.	An SIS may be a credit card verification system, or a debit card processing system.
6. Acquire product.	An example is ATMs which can also deliver airline tickets.
7. Test and accept product.	An example is a pharmacist who checks a new prescription against other drugs a customer is taking for possible drug interaction problems.
Manage Product's Use	
8. Maintain needed inventory.	An example is a supplier keeping track of shipments for JIT systems.
9. Monitor product.	For example, monitoring purchases and returns of unsold magazines by magazine publishers.
10. Upgrade product.	For example, sending automatically latest volumes in a book series by book publishers such as Readers Digest.
11. Repair product.	For example, sending reminders to customers whose maintenance contracts of electric appliances are about to expire.
Dispose of Product	
12. Dispose or transfer product.	Examples are self-service checkout in some hotels.
13. Account for product.	For example, travel agents maintaining travel records of large corporate clients to describe how travel money is being spent.

Thus, a customer resource life cycle can be used to identify and implement SIS by focusing on how to help customers acquire and use a product or service. The customer resource life cycle model provides a much more detailed analysis for identifying and categorizing SIS in comparison with other tools.

3.15 CUSTOMER RELATIONSHIP MANAGEMENT

Customer relationship management (CRM) is a business strategy that focuses every business activity a company does on its customer. CRM entails getting upper management support for implementing new strategies and technologies that allows the organization to get a single view of each customer and to better service the customer both now and in the future. Companies are interested in retaining current customers because of higher costs associated with seeking new customers—at times, these costs can be as much as five to one.

The size of the CRM market is debatable, but it is a billion-dollar market with estimates for 2004 ranging from $2.14 billion to $26.5 billion. The big vendors that provide CRM are Siebel Systems, PeopleSoft, and Oracle. A big focus of CRM is to integrate all of a company's departments and customer touch points so that customer information can be turned into knowledge to lead future decisions. CRM consists of different modules, the four most prominent being sales force automation, marketing automation, call centres, and analytics/data mining.

Like other IT strategies, CRM has critical success factors to follow if a company hopes to implement a program successfully. These success factors are:

- planning and setting the direction
- managing service and communication
- strategizing technology relationships
- managing personnel and enterprise
- protecting information
- strategizing resource investments and applications
- rewarding and acknowledging contribution
- implementing correctly
- focusing on the customer

From these critical success factors of CRM come best practices; they are—

1. high level of communication

2. management support
3. strategy drives technology
4. implement incrementally
5. hire outside experts if necessary
6. involve knowledgeable users
7. customer-oriented focus

Keeping best practices of CRM in mind, Nexstar was studied and evaluated to see its use of CRM. Nexstar was formed in 1999 with the vision to be a leader in customer service and satisfaction in the mortgage loan process industry. It utilized Siebel, one of the aforementioned big vendors in CRM, to integrate its call centre and manage its workflow. Nexstar has a successful CRM system in place and enjoys higher-than-industry-average customer satisfaction ratings.

CRM is a good business strategy and is likely to continue its growth in the future but companies must be aware that it is not a cure-all and must be planned and implemented appropriately to be successful.

3.16 STRATEGIC OPTIONS GENERATOR

This model intended to reduce the multiplicity of strategic actions undertaken by organizations, reduces them to only five generic thrusts · differentiation, cost, innovation, growth and alliance.

You can view strategic perspective in terms of strategic thrust, this is a major move which an enterprise undertakes in its search for advantage. By supporting or shaping a strategic thrust, an SIS supports or shapes the organization's effort to obtain a competitive advantage. Thus, a strategic thrust is a critical interface joining competitive strategy with IT.

These generic strategic thrusts manifest strategic polarities, i.e. they are capable of assuming opposing sets of attributes depending upon their strategic use. For instance, some organizations use differentiation offensively while others use it defensively. Using differentiation offensively an enterprise attempts to gain a competitive edge and thus increase its market share. On the other hand, using differentiation defensively means the firm will simply be attempting to protect its share from a competitor's attack. The same argument applies to the other four strategic thrusts.

Generic strategic thrusts frequently occur in combination. For instance, a growth thrust may be combined with a cost-reduction thrust, or an

innovation thrust may be part of a differentiation thrust, or some other combination of thrusts may take place.

The strategic thrusts serve as the engine that powers the strategic options generator, an instrument designed to help identify SIS opportunities. The option generator brings focus on three strategic targets, and then the thrust can be used to hit them. There are three basic classes of strategic targets, suppliers, customers, and competitors. Thus, there are a total of 5 × 3 (15) different ways of searching for an SIS opportunity (see Figure 3.5).

What is the strategy target?

	Supplier	**Customer**	**Competitor**
Differentiation	Offensive? Defensive?	Offensive? Defensive?	Offensive? Defensive?
	To use it?	To use it?	To use it?
	To provide it?	To provide it?	To provide it?
Cost	Offensive? Defensive?	Offensive? Defensive?	Offensive? Defensive?
	To use it?	To use it?	To use it?
	To provide it?	To provide it?	To provide it?
Innovation	Offensive? Defensive?	Offensive? Defensive?	Offensive? Defensive?
	To use it?	To use it?	To use it?
	To provide it?	To provide it?	To provide it?
Growth	Offensive? Defensive?	Offensive? Defensive?	Offensive? Defensive?
	To use it?	To use it?	To use it?
	To provide it?	To provide it?	To provide it?
Alliance	Offensive? Defensive?	Offensive? Defensive?	Offensive? Defensive?
	To use it?	To use it?	To use it?
	To provide it?	To provide it?	To provide it?

Figure 3.5: Wisemans strategy option generator

The strategic options generator is a very useful tool because it offers a complete framework with which to search for and also evaluate SIS opportunities.

SUMMARY

In this topic you studied the strategic use of information technology through various concepts and frameworks. You studied concepts of information systems (IS), information technology (IT) and the notion of IS and IT strategies. You looked at the impact of IT on organizations. The development of IT can be divided into three eras: data processing era, management information systems era and the strategic information systems era. IT can be used as a strategic resource rather than as a utility and it can play a role in providing competitive advantage. You looked at inter-organizational systems, their characteristics and function, reasons for their growth, and their strategic role. Finally, you were introduced to five well-known frameworks for determining potential for strategic use of IT.

GLOSSARY

Customer resource life cycle analysis	A tool for determining the strategic potential of IS/IT by analysing the life cycle of products or services from the customer's perspective.
Data processing systems (DPS)	Information systems whose primary function is the processing of business transactions to produce predetermined reports on schedule.
Decision support systems (DSS)	Information systems for managers and professionals aimed at supporting them in their specific decision-making tasks, rather than replacing them by automating their tasks.
Electronic data interchange (EDI)	The electronic transfer of business information from one independent information system (IS) to another, using agreed-upon standards for terms and formats of documents.
Electronic markets	An IT-based market place with several buyers and several sellers conducting business through an electronic intermediary (an IOS).
Factory	Organizations in the categories of strategic relevance and impact that are heavily dependent on their existing operational systems but their future IS/IT development is not fundamental to their ability to compete.
Information system (IS)	Computer-based systems for collecting, retrieving, processing, storing and/or disseminating information to support organizational decision making and control.

Information system (IS) strategy	· Strategy determining what an organization should do with the information technology. It is primarily concerned with IS development for gaining strategic advantage.
Information systems technology (IT)	· Refers to both IS and IT together in an organizational context.
Information technology (IT)	· Refers to technology comprising of computer hardware, software, telecommunication networks, workstations, robotics and smart chips.
Information technology (IT) architecture	· Refers to the technology framework that guides the organization in satisfying its business and management information system's needs. It includes the computing hardware and its associated operating system software;

telecommunications networks and their associated mechanisms for inter-linking and inter-working; the data bases of the organization and the requirements of use, access, control and storage; and the main IS applications of the organization, their functions and relationships, as well as the development methods.

Information technology (IT) platform	· It includes hardware and software architectures, connectivity architecture and bandwidth alternatives.
Information technology (IT) strategy	· Refers to how an organization should realize it IS strategy. It is primarily concerned with technology policies and architecture, risk attitude, vendor policies and standards.
Inter organizational systems (IOS)	· Special type of communication-intensive information systems whose development, operation and use is shared by two or more organizations.
Management information systems (MIS)	· Information systems that also provide enquiry and analysis capabilities to the end users.
Management support systems (MSS)	· Information systems having combined features of DSS, EIS and conventional MIS.

Strategic	· Organizations in the categories of strategic relevance and impact for whom smooth functioning of the IS/IT activity is critical to their operation, and whose IS/IT applications under development are critical for their future competitive success.
Strategic grid	· A tool for analysing the potential strategic impact of IS/IT on an organization.
Strategic information systems (SIS)	· Information systems that are used to support or shape the competitive strategy of the organization, its plan for gaining or maintaining competitive advantage or reducing the advantage of its competitors.
Strategic options generator	· A tool for determining the strategic potential of IS/IT based on strategic thrusts for searching and evaluating SIS opportunities.
Strategic thrust	· A major move that an enterprise undertakes in its search for competitive advantage.
Support	· Organizations in the categories of strategic relevance and impact that are not fundamentally operationally dependent on the smooth functioning of IT activities, and their planned IT applications portfolio is also not aimed at their critical needs.
Turnaround	· Organizations in the categories of strategic relevance and impact that are not absolutely dependent on the current IT activities, but whose IT applications under development are absolutely vital for the firm to reach its strategic objectives.
Value chain analysis	· A tool for determining the strategic potential of IS/IT by analysing the value activities of the firm and the industry.

4 STRATEGIC USE OF INFORMATION TECHNOLOGY

INTRODUCTION

This chapter 4 introduced the concepts of IS and IT strategies. IS strategy is concerned primarily with aligning IS development with business needs and with seeking strategic advantage from it. IT strategy, however, is concerned primarily with technological policies, and tackles questions of architecture including risk attitudes, vendor policies and technical standards. IS and IT strategies can be seen as the products or results of the IS strategic planning process. These strategies broadly define the approach an organization adopts in the use of IT. The IS strategic planning process also produces IS plans, which identify specific business applications that will make use of IT, as well as the technological components required to support the business applications. Hence, IS strategy and IS plans are closely related.

This topic begins with Richard Nolans stage model. The model gives you more than a retrospective look at what has happened to IS strategies · it also suggests that the nature of IS strategy changes over time, and that all organizations do not treat IS strategies in the same way. In particular, some organizations today call themselves extended enterprises in which IS strategies are exceptionally important. An IS strategy begins with a planning phase, which has always been an important task for IS management. The long lead time for hardware delivery, the difficulty of software development, the costs of hardware and software, and the preparation needed for user training and IS implementation all demand advanced planning. The IS planning task, which was formerly primarily technical, has taken on a new dimension due to the emergence of strategic information systems (SIS, described in topic 3) and requires new linkages with the business planning process. Specifically, managers have had to become aware that uses of IT can have significant effects on their organizations competitive position, and that IS planning needs to be coupled more closely with the goals of the organization. In fact, IS planning, or lack of it, can now affect business plans.

4.1 STAGES OF GROWTH MODEL

The developing sophistication of IT use and management. This model, known as the stages of growth model, is based on the premise that any organization will move through various stages of maturity with respect to the use and management of IT. The stage model attempts to help managers interpret the growth stages and the meaning of that stage of their organization with respect to IT.

The initial version of the growth model consisted of only four stages: Initiation, Expansion, Formalization and Maturity.

1 Initiation, when computers were first introduced to business organizations. Management saw IS as a means to make cost savings. They rarely considered the long-term implications of the IS. In many cases, the systems installed belonged to computation-intensive departments like accounting. Treated as another tool to help with tedious work, IS did not arouse management attention.
2 Expansion, when IS enjoyed a sudden, contagious, and uncontrolled proliferation in many business functions. Management did not see the problems of over-ambitious projects, which resulted in large expenditure on building relatively worthless Iss.
3 Formalization, which signals a general concern from senior management. When they wish to justify IS spending, IS staff numbers are trimmed down and IS budgets are centralized. Consequently, IS development becoming difficult.
4 Maturity, when IS development has reached a stage of balance. That is, senior management learns to leverage between stability and innovation.

Later, Nolan added two more stages to the model to account for an organizations behaviour, indicating a fundamental transition from the task of managing the computer technology to that of managing the data resource, caused by the introduction of databases and data communication technologies. This later model containing six stages suggests that maturity can be subdivided into three more specific stages. This is an enhancement and not a replacement for the earlier (four-stage) model.

The six stages in Table 4.1 are distinguished from one another in aspects such as planning and control, IS organization, user awareness and expenditure level.

Table 4.1: Stages of Growth Model (Adapted from Robson 1997, 147)

	Stage 1 Expansion	Stage 2 Formalization	Stage 3 control	Stage 4 Integration	Stage 5 Data Administration	Stage 6 Maturity
Planning and control	Lax	More Lax	Formalized planning and control	Tailored plans and control systems	Shared data and common systems	Strategic planning
IS Organisation	Specialised for technology learning	User-oriented programmers	Middle management	User/IS account teams	Data administration	Data resource Management
User awareness	' Hand off'	Superficially enthusiastic	Arbitrarily held accountable	Accountability learning	Steady rise	Acceptance of joint user and IS accountability
Expenditure level	Steady from zero base	Steep rise	Steady rise	Steep rise	Steady rise	Appropriate

Compared to the original four-stage model, the first three stages (concerned with computer technology management) remain the same, but after the critical transition point into stage 4, Nolan found that putting together all growth experience as one stage was inadequate and he divided this into three stages:

4 Integration, during which the control levels of Stage 3 are lowered to encourage innovation. The IS function will be reorganized to allow IS staff to become more involved with the working of the entire organization. There may be a steep rise in the expenditure level because of development of backbone integrated IT architecture.

5 Data administration, which identifies the business value of cross-function database access. IS strategies at this stage often lead to the construction of an IS architecture that includes some intra- and/or inter-organizational systems.

6 Maturity, which, as in the four-stage version, aims at planning and developing IT in coordination with business development.

Despite the more detailed breakdown into six stages, others felt that the model did not show the whole picture. As organizations embark upon deploying new technologies such as client-server architecture after the hierarchical mainframe-based one, they experience a repeat of the characteristic S-curve and of the stages of growth. The starting point for the new technology will not be zero, but neither will it be a smooth continuous progression (as assumed in the model). Not surprisingly then, new technologies significant enough to be Strategic bring about discontinuities in growth. Apparently, the organization needs new Learning when it moves from old to newly adopted technology. This Learning notion is one of the key assumptions behind the stages of growth model. These key assumptions must be accepted if this model is to be used. These assumptions are:

- Organizational learning permits the movement through the stages · it is the Experimentation of stage 1 that leads to the Expansion of Stage 2, and it is this expansion that enforces the need for Control in Stage 3.
- Stages cannot be bypassed since every experience is necessary for the next stage · with no experimentation, there are no promoters for the contagion stage!
- Although there is a Natural progression, the transitions can be planned, coordinated, and managed to permit painless movement · recognition of the stages is a suggestion of a sequence for planned and managed change.

This contingency theory means we can exploit strategic IT opportunities. Knowledge of the current maturity position provides a base from which we can develop appropriate IS strategies, management styles, control approaches and investment levels.

In the model, the turning points of the curve represent crisis points where major management shifts may be required. Nolan suggests two levels of benchmark indicators, but even then there are a number of problems in applying them since the symptoms described refer to the mainframe era and are no longer valid today. However, the most significant advantages of this model are:

- It is simple.
- It is easy to understand, to use, and to see that some natural development is to be expected.
- It is relevant to acknowledge the past in the present.
- It acknowledges that different IT can be in different developmental stages and hence need different management treatment.

Let's summarize the stage model. Modelling the development of IT is a very useful exercise, whether the model is a simple or complex one. Stages-of-growth approach is a simple way of modelling IT maturity as the basis for IS planning. This model, first proposed by Nolan and Gibson, is based on the premise that IT management and planning strategies should depend on the maturity of an organization with respect to IT use. The maturity, or the stage of growth, can be determined on the basis of stage benchmarks.

Nolan's stage model was proposed at the time when no one had ever heard of the Internet. With the advent of PC and telecommunications

technologies, business organizations are now probing the possibility of extending their business operations over the Web. The Internet is a convenient place to re-structure the relationships between customers, suppliers, partners and internal activities of an enterprise. Corporate information systems are connected to form cross-organizational or inter organizational systems. That's why well discuss extended enterprises in the following subsection.

4.2 AN EXTENDED ENTERPRISE

IS strategy evolving in much the same way as Nolan predicted in his stage model. Given the availability of large scale databases and fast communications networks, many organizations have turned themselves into extended enterprises that operate on the basis of inter-organizational information systems and form highly competitive value chains.

We must emphasize that the Internet is not the only driving force behind the trend of extended enterprises. Some other drivers for the building of cross-organizational systems are:

- an increased focus on core competencies · companies can concentrate on what they do best (e.g. to market products and interact with customers are excellent in Company A) and other activities can be outsourced to others;
- an increased need for partnering · modern design usually requires parts from different vendors where business partnering is an advantage; and
- an increased request for flexibility · driven by the rate of technology change and the shortening product life cycle.

No matter how small a step the construction of extended enterprises moves business organizations up on Nolan's ladder, the idea has already been associated with a number of innovative theories in information system management. To help you develop an understanding of extended enterprises, please read the following chapter.

Recently, extended enterprises have been considered as a natural environment to integrate legacy systems (internal) with the processes of supply chain management (inward facing) and customer relationship management (outward facing). A higher level of data administration (in Nolans stages) can be achieved by forming an end to-end connection between suppliers and customers. This is why data warehousing and knowledge management are mentioned in Chapter 5 of your textbook.

Providing efficient communications between its partners can become a competitive advantage for the enterprise. This new breed of intermediaries will be moulding business practices in the age of e-commerce.

In a nutshell, there is no standard description on what the nature of IS strategy should be. It varies according to how different organizations see it. When an IS strategy is brought to managements the attention, it requires a more workable schedule and manageable activities. The IS planning process will be discussed in the next section.

4.3 INFORMATION SYSTEMS PLANNING

IS planning refers to the broadly based management activity that provides direction within an organizational setting for the development and use of information systems and technology. Also defined as the process of establishing IS goals to support business goals, the identification of IS and associated resources necessary to support the achievement of these goals, the establishment of priorities, schedules and budgets, and the management of specific development efforts.

The field of IS planning is relatively new and the rate of change in this field is high. As a consequence, the concepts and terminology used in the literature are not always well defined. IS planning is used as a generic term covering similar notions such as strategic information systems planning, strategic data planning, strategic information planning, MIS planning, information resource planning, information technology planning, information systems strategic planning, and strategic information management planning. (You should understand from those aforementioned titles that the planning is generic to cover areas such as IS, IT, information resources, data architecture, etc.). However, IS planning is not limited to the strategic angle, so a more general definition would be used here. In topic 1 and topic 2, planning was defined as an analytical process for determining objectives in the context of future and selection of a course of action to achieve them. In other words, IS planning is the process to make and integrate decisions with respect to IT support throughout the organization, using formal procedures and producing articulate results. These results can either be explicit decisions or provide input to other (informal) decision-making processes.

IS planning could be differentiated by the time over which it is valid; that is, the planning horizon. IS strategic planning being long-term and usually

covers the next three to five years or more, although the exact timeframe is dependent upon the volatility (frequency of change) of the organization and its environment. It also forms the basis for short-range IS planning: tactical planning, which is medium range and commonly addresses the period from one to three years; and operational planning, which considers the near-term of three months to one year.

IS planning has both a process and a product side to it. Though it refers to process and not the product, the two aspects are often equally important. That is so because the quality of the process determines the degree of acceptance of the products, and hence their influence on the desired effects of IS planning. As IS planning has evolved, the content of both process and products has changed, as you will see in the next section.

Historical Evolution of IS Planning

The evolution of IS planning can be divided into six stages:

- No IS planning
- First generation · demand-driven IS planning
- Second generation · methodological IS planning
- Third generation · organization-wide IS planning
- Fourth generation · IS and business strategy interaction
- Fifth generation · integrated methodologies

No IS Planning

The data processing era of the 1960s, the principal uses of ISs were to automate the basic business processes of the organization. The main goal of management when introducing computers into their business was to reduce the cost of processing information, and therefore the first IS applications were (and still are) in the areas of accounting, payroll, invoicing, etc. In this context of cost reduction as an exclusive goal, formal IS (or Data Processing (DP) plans neither existed nor were they generally necessary.

The Electronic Data Processing (EDP) department would simply receive requests for developing IS applications and would implement them as efficiently as possible. DP plans were, therefore, plans for developing and implementing user requests for DP applications. The decisions to be made mainly related to selecting the DP projects and allocating resources, which could be easily made at the DP department level on the basis of a cost-benefit analysis based on strictly economic terms.

First Generation: Demand-Driven IS Planning

This phase of IS planning is characterized as demand-driven, focusing on the efficient allocation of resources, with return on investment used as a ranking methodology. As the number of IS applications to be developed and maintained grew, the need was felt by the EDP department to create an overall picture of IS development and a procedure by which to judge the requests for new IS development. As a result, traditional systems development methodologies were enhanced to incorporate some kind of global scan for information needs and problems throughout the organization and for ways to set priorities between them.

The IS planning in this stage mainly focused on management of DP activity. However, this aspect was left to the EDP department itself, as is clear from the fact that IS development methodologies, which were mainly used by EDP staff, were extended to incorporate these planning aspects. Still, the crucial problem at this time was to involve management in developing the DP plan and in deciding the priorities for IS development. Another crucial issue was the integration and coordination of various IS applications for which no techniques were available then.

Second Generation: Methodological IS Planning

This phase of IS planning began to focus on the effective allocation of the organization's resources to information systems technology. The IS plan became a response to business strategy as an organization-wide approach is characterized. In order to solve the problems stated above, some methodologies were developed that were specifically aimed at the phase prior to system development.

One of the first and most well-known of such methodologies was IBMs Business Systems Planning (BSP), and many others were derived from it.

Another important methodology of this period is the Critical Success Factors (CSF) approach. These methodologies took the view that information is a corporate resource and should be planned on a corporation-wide basis. As a consequence, these methodologies stressed top-down planning of data and localized design of systems in different user areas, as well as top managements involvement in IS planning.

The rise of IS planning methodologies created awareness that information itself should be regarded as one of the principal resources of the organization. Therefore, apart from IT, information itself is considered

something to care about, to plan and to manage. The realization that a long-term IS plan requires a stable basis, as realized by a more data-driven approach, triggered a fundamental look into the information flows throughout the organization. This increased interest in information led to the need for more senior positions such as Chief Information Officer (CIO) as compared to IS or MIS manager, and to the formulation of an IS strategy prior to the execution of an IS development project. During this stage, even though top management perhaps did not recognize the strategic impact of information systems technology on the organization, those involved in the IS planning process did, and a search for methods to align the IS strategy with the organizational strategy started. This initiated the next stage in IS planning.

Third Generation: Organization-Wide Long-Term IS Planning

The fourth phase of IS planning resulted from a realization that the key to effective IS management was the ability to match IS services with the advancement of IS applications within the organization. During this phase, an organizational IS progress map (in terms of IS growth stages) was used to analyse opportunities for improved IS support and growth as well as the quality of the IT infrastructure. Thus, it became easier to engage in long-term IS planning.

Fourth Generation: IS and Business Strategy Interaction

This phase of IS planning reflects a much higher level of interaction between business strategy and IS strategy. IS was no longer considered solely as a support function. Rather, IS and business strategies had to recognize the explicit potential for IT to shape as well as to support the organization's competitive strategy. IS planning methodologies of this period became more externally-oriented in perspective, and directly incorporated techniques such as competitive analysis. Most of the planning tools discussed in topic 3 belong to this phase of IS planning.

Fifth Generation: Integrated Methodologies

This phase represents the current state of IS planning. Functional and IS management are now recognizing that business and IS strategies cannot be regarded as stable and that there is an imperative need to take account of the dynamic environment in which they operate. Linked to this is the need to formulate IS staff development plans explicitly, both as a means of gaining competitive advantage as well as for resourcing reasons. Due to these realizations, IS planning is now entering a new phase in its development. This phase involves the use of integrated methodologies,

where planning reflects the joint IT possibilities of strategic support and strategic weapons. Earlier IS planning methods and frameworks have been merged together with strategic possibility frameworks to produce an IS plan for both support and strategic roles.

The essential characteristics of the five generations of IS planning (leaving out the one when there was no IS planning) are summarized below:

IS Planning Phases	Characteristics
First generation	Demand-driven
	Return-on-investment
	Efficient allocation of resources
Second generation	Organization-wide planning methodologies
	Data modelling approach
	Response to business strategy
	Efficient allocation of resources
	Business Systems Planning (BSP)
	Critical Success Factors (CSF)
Third generation	Long-term IS planning
	IT infrastructure
	IS progress map
	Improved IS support and growth
	Stages theory of IS development
Fourth generation	Externally oriented planning methodologies
	Competitive analysis
	IS and business strategy interaction
	Support and strategic approach to IS
Fifth generation	Integrated planning methodologies
	Dynamic business strategy
	Strategic possibility frameworks
	Need for IS staff development plans
	Extended enterprise

Organizations today are mostly engaged in the second- to fifth-generations of IS planning. Although innovative businesses might involve themselves with integrated IS planning, as extended enterprises do, there are still other organizations that invest heavily in a BSP and CSF study to improve their competitive advantage. BSP and CSF will be discussed in the next topic. The argument in this section only indicates the evolution of IS planning methodologies in a temporal (time) scale. Whether a

technique is adopted by an organization depends on a number of factors: corporate culture, business nature, IT maturity, and so on. But in whatever stage its IS strategy is, an organization should see the importance of IS planning.

Importance of Information Systems
An understanding of the effective and responsible use and management of information systems is important for managers and other business knowledge workers in today's global information society. Information systems and technologies have become a vital component of successful businesses and organizations. Information systems constitute an essential field of study in business administration and management, as they are considered a major functional area in business operations.

Managerial end users need to know how information systems can be employed successfully in a business environment. The important question for any business end user or manager is: What do you need to know in order to help manage the hardware, software, data, and network resources of your business, so they are used for the strategic success of your company?

Foundation Concepts - basic behavioral, technical, business, and managerial concepts about components and roles of IS, Business Applications - major uses of IS for the operations, management, and competitive advantage of an E-business enterprise, including electronic business, commerce, decision-making using the Internet, intranets, and Extranets. Development Processes - how business professionals and information specialists plan, develop and implement IS to meet E-business opportunities using several strategic planning and application development approaches.

Management Challenges - challenges of effectively and ethically managing E-business technologies, strategies, and security at the end user, enterprise, and global levels of a business.

Information Technologies - Major concepts, developments, and management issues in IT (hardware, software, networks, data resource management, and other information processing technologies such as the Internet).

An Information System (IS) can be any organized combination of people,

hardware, software, communications networks, and data resources that collects, transforms, and disseminates information in an organization.

Objectives of IS Planning

IS planning objectives may vary from one organization to another. Therefore, it is important to clarify the objectives of IS planning before embarking on it. Objectives could be general but must be meaningful and achievable. The following set of general objectives for IS planning:

- To ensure that all IS efforts are consistent with, contribute toward, and eventually influence organizational strategies.
- To ensure that IS applications address critical organizational information processing needs in terms of both opportunities and problems.
- To define and communicate the role of the IS function throughout the organization.
- To convey to the organization, the extent of current and future IS resource commitments.
- To enhance communication between the IS function, top management and users.
- To ensure that a solid systems foundation or IT architecture is built, on which more sophisticated IS applications can be based.
- To cultivate a core group of organizational proponents: i.e. users and top management.
- To control and direct the acquisition and deployment of IS resources.
- To ensure that the IS staff remains technologically current.

A study conducted a field study investigating 21 large UK-based organizations to discover the intents, outcomes and explanations of IS strategic planning. The 63 respondents were asked to state their organization's current objectives for IS strategic planning. Table 3.1 lists the objectives by their rank order, as identified by the respondents:

Table 4.1: Objective of IS Strategic Planning

Rank Order	Objective of IS Strategic Planning	Respondents (Out of 63)
1	Aligning IS with business needs	59
2	Seeking competitive advantage from IT	45
3	Gain top management commitment	36
4	Forecast IS resource requirements	35
5	Establish technology path and policies	30

This table suggests that organizations have more than one objective for IS strategic planning; narrative responses usually identified two or three objectives spontaneously.

The two sets of objectives given above have some common points such as communication enhancement and determining resource requirements. But, otherwise they have many differences. In fact, no two IS strategic planning exercises have precisely the same objectives. The variations exist because of many factors, such as:

- The size of the business unit under consideration.
- The current IS applications portfolio.
- The stage of IS planning evolution in the organization.
- The immediate problems facing top and IS management.

Depending on the reasons that prompt the IS planning exercise, different emphasis may be placed on certain activities that may change the objectives.

You should now understand the importance of setting IS planning exercise objectives both for the planning team and to the organization as a whole.

Once determined, the objectives of an IS planning exercise represent a direction in which the organization should invest its time and resources. Depending on the level of IS planning (which will be discussed in the following section) spelling out every detail of the plan is sometimes not necessary. In whatever way, the IS planning committee must have taken the following issues into consideration:

1. The relative spending, or resource allocation, for each area involved in the plan;
2. The relative priorities between and within each area; and
3. The justification for each application or module in the plan, except for the mandatory ones.

In the next section, you'll see how the IS plan varies as it is formulated to suit the information requirements of different levels of management.

Levels of IS Planning

As we described earlier, IS planning can be classified as strategic, tactical or operational depending primarily on the planning horizon.

(a) IS Strategic Planning

IS strategic planning being the process of ensuring alignment between business plans and objectives and IS plans and objectives, and/or the process of identifying IS applications that will provide the organization with a competitive edge. It is the process of converting the organization's long-range IS strategies into long-range IS plans. The process takes the information found in the IS strategy statement and adds detailed actions and elements of various resources required to attain the stated goals. These resources consist of people, money, facilities and technical capabilities, blended together and working toward the objectives. The strategy contains statements about assumptions, risks and dependencies. Assumptions in the strategy must be converted to reality and dependencies need to be accounted for in the plans. The risks noted in the strategy must be mitigated to the fullest extent possible by specific actions to accomplish the goals and objectives.

As an example, consider an organization whose strategic objective is to improve market response times by automating product design, development and manufacturing. The strategy includes installing computer-aided design and manufacturing (CAD/CAM) systems for design and development engineers as well as for the plant. These systems are to be fully operational in 48 months. The strategy statement contains the assumptions for using CAD/CAM and outlines dependencies and risks. For example, resistance to the new systems might be a risk. The IS strategic plan adding details of schedule, actions and resources such as space requirements, user training, capital and operating expenses. The plan may also state that the space will be leased and that any resistance to the new systems will be overcome by providing training.

IS strategic planning has, as its focus, effectiveness and efficiency aiming at establishing the direction of IS development rather than identifying specific IS development projects. At the IS strategic planning level, the involvement of both IS management and top management is necessary. The IS staff brings analytical, informational and technical skills to the planning process while top management brings business knowledge. This mix is good for Apolitical reasons since the strategic planning process needs to promote dialogue, mutual respect and cordiality between IS staff and the rest of the organization.

(b) IS Tactical Planning

IS tactical planning focuses on prioritizing and scheduling IS development

efforts, establishing action plans for development and performance measures to be used during operational planning. It generally covers the current year in detail and the subsequent year(s) in less detail. Management commits to implement the tactical plans and the plans are used to measure managements as well as the firm's performance. For these reasons, these plans are sometimes called measurement plans. They also provide feedback on the degree to which the foundation for meeting strategic objectives is being laid. Tactical plans are more detailed and have a more direct bearing on near-term activities than strategic plans. They provide guidance to very short-range activities and link the near-term actions to long-range goals.

Generally speaking, IS planning at the tactical level covers a much broader spectrum of IS projects than IS strategic planning. IS projects considered during tactical planning might have originated from IS strategic planning efforts, user requests, routine maintenance efforts or mandates from external organizational sources. Generally, the entire portfolio of IS applications is categorized first according to their source before being prioritized. Issues such as software and hardware migration, disaster recovery, IS personnel training, capacity planning and general security are also considered at this level. During tactical planning, a Mix of planning participants is again found. This mix depends upon the objective of the tactical planning process. For example, steering committees consisting of users, IS and top management representatives will typically be formed for the purposes of prioritization and project approval. When issues such as training, capacity planning, disaster recovery and security are being considered, however, the involvement of technical IS staff is most critical. However, for identifying additional IS applications in the category of Ongoing maintenance or Operational necessity, the participation of users at lower organizational levels is necessary.

Referring back to our CAD/CAM example given above, the tactical plan describes many activities planned for the first two years. Some of these may be selection of hardware/software, installation of hardware and software systems, user and IS staff training, conversion from old processes to new procedures and setting up measurement systems. Details such as where and from whom the space will be leased and what type of training would be required need to be included in the tactical plan. Schedules should be provided for all these activities, human and material resources must be allocated and detailed budgets must be developed for the plan to be complete. Management would also have to agree to the plan, which

would be measured on the degree of plan attainment. Thus, the tactical plan would be the basis for day-to-day activities.

(c) IS Operational Planning

IS operational planning involving the development of specific detailed plans for each IS project. It entails the selection and approval of IS projects to commence within the next planning year, and the actual planning, monitoring and control of specific systems development efforts. Operational planning adds details to the near-term activities of the organization, giving direction on a day-to-day or week-to-week basis. Operational plans are generally used by first-line managers or by non-managerial staff as they carry out their assignments. Operational plans usually require much analysis, in addition to that required for the tactical plan, and they also contain control elements. They show managers how well the daily or weekly activities are progressing. To continue with the CAD/CAM example, the operational plan will contain near-term tasks related to its installation. These could be identification of hardware/ software vendors, defining vendor selection criteria, developing space alternatives, and conducting systems analysis of existing procedures. Simultaneously, along with the execution of operational plans for the current short-term, planning for the next short-term will begin along with budget allocation and tracking costs.

Planning groups at the operational planning level more typically comprise IS staff. User/management representatives will, however, be required to participate in system development, review deliverables, prototypes and so on.

The following table provides a summary of the major differences between the three planning levels.

Table 4.2: Differences between Planning Levels

	Strategic	Tactical	Operational
Focus	Alignment/impact effectiveness	Prioritization/scheduling Resource allocation	Commitment
Planning cycle	Episodic (35 years)	12 years	12 months (or less)
Perspective	Business	IS	IS

Participants	IS management and top management/ steering committee	Steering committee/IS staff	IS staff/ management
Scope	Narrow · critical issues and projects	Broad · all projects	Narrow · individual projects

(d) IS Planning Cycle

In most organizations, planning activity is regularly scheduled and is seasonal. Generally, the tactical plans are developed first so they can be approved just prior to the beginning of the tactical period. Thus, the tactical plan for the next two years is developed and approved during the few months prior to the beginning of the new year.

In a model-planning calendar, the IS strategic planning takes place shortly after the beginning of the new year and is completed and approved around mid-year. When completed, it covers the period from 2.5 years in the future to the end of the extended planning horizon, perhaps five or more years into the future. Then the second iteration of planning takes place in relation to current plans. The new tactical plan incorporates the first year of the previous strategic plan, and the new strategic plan adds an additional future year, as shown in Figure 4.1.

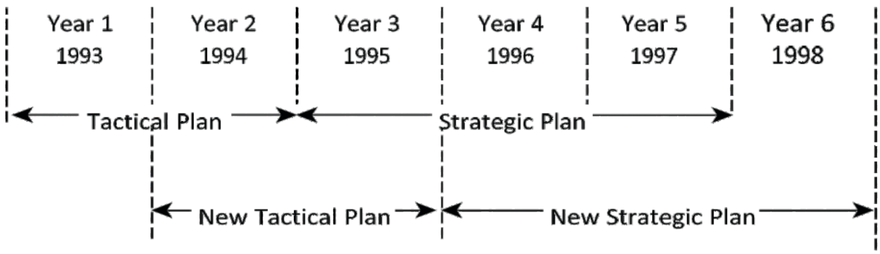


Figure 4.1: Revision cycle of IS plans

For organizations with a well-established planning cycle, planning does not start from the beginning with each iteration. Rather, as shown above, the new tactical plan revises the second year of the previous plan and adds to it the first year of the previous strategic plan. The new strategic plan is a revision of last year's plan and adds a new year. The revisions may be necessary to reflect changes in the plan due to new or revised strategies, changing business conditions or environment. Failure to achieve prior

goals or objectives, or changes related to risk management or dependency may also lead to plan revisions.

Thus, the entire planning process is cyclical and repetitive, with revised longer-range plans becoming more near-term with each planning cycle. Operational plans are generally not as tightly scheduled, and if the implementation of the tactical plan is proceeding smoothly, these plans may very well be of an ad hoc nature. In fact, the need for short-range plans depends on the circumstances and on the activities of the function and the organization.

4. 4 LINKING BUSINESS AND IS PLANNING

In this topic you studied the link between IS strategy, which is concerned primarily with aligning IS development with business strategy, and IT strategy, which is concerned primarily with technology policy and architecture. also defined information management (IM) strategy, as the role and structure of IT activities in the organization. Thus, IS planning consists of formulating each of the above three strategies · dealing with technology (IT), systems (IS), and management (IM).

A research takes a socio-technical perspective of IS and also adds a Change Management (CM) strategy and a Human Resource (HR) strategy as part of the IS strategy, as shown in Figure 4.2.

According to this model, IS strategy is very much embedded in business strategy: it both feeds off, and feeds into, the business strategy process. But, while IS planning should be closely associated with the business planning process, it is still too often the case that the link is tenuous at best. The two processes are often undertaken in isolation from each other and with little business planner involvement in IS planning.

Further, across a wide spectrum of markets and countries, IS is transcending its traditional support role and is evolving into a strategic role as described in topic 3. Such a shift has the potential not only to support chosen business strategies but also to shape new business strategies. Yet there is an increasing concern that the anticipated value of IT investment is not being achieved with a growing number of organizations outsourcing their IT operations. This inability to realize value from IT investments has been ascribed to the lack of alignment between the business and IS strategies of the organizations that are making the investments.



Figure 4.2: Galliers Business and IS Strategy Linkage Model

4.5 BENEFITS OF IS PLANNING

The need for IS planning is clear. The initial focus of IS planning was on providing a means of control over a growing expense. Later concerns turned to the acquisition and integration of compatible information technologies. Recently, as IT gained competitive importance, IS planning took on a strategic significance. However, despite awareness of the importance of IS planning, the distance between interest and mastery in the area remains significant.

IS planning being a complex activity. More effort spent on the IS planning process results in several benefits for the organization as well as the IS management. IS planning helps ensure that the information needs of the organization are considered during the course of normal business planning. The integration of the IS plan and the overall business plan allows the organization to ensure that the IS plan supports the business direction of the firm.

An orderly IS planning process also allows IS management to focus on key business results rather than just on completing projects. This shift in focus can often result in a better integration of existing and future IS applications. Even though the need for conducting unforeseen or corrective work will still arise, the IS management, however, will be better able to handle such occurrences if a framework of objectives is given.

IS planning also provides a sound base for IS project selection and prioritization, and facilitates effective IS resource allocation. Operating within a well-conceived framework of objectives and strategic initiatives leaves the firm in a better position to evaluate potential IS projects for their true impact on the organization. More importantly perhaps, the IS planning process helps reduce the risk that money will be spent on ill-fated IS projects that occur because of a lack of a cohesive set of IS plans and objectives.

Good IS planning also helps in the IS control process. Unless the IS management has a concrete idea of what is supposed to be going on, it will be in a poor position to evaluate progress and make appropriate adjustments. Strategic objectives, operating plans, and budgets provide the IS management with concrete guidelines by which to evaluate actual results in order to control IS effort.

User satisfaction has often been a concern of IS departments and their users. Although most IS applications may perform adequately, some users may still report feelings of dissatisfaction. Often such concerns come from a lack of understanding about the design objectives of a particular IS application. Effective IS planning cannot be conducted without user input. Input in the IS planning stage can greatly increase the likelihood that this important resource i.e. Information Systems Technology (IST) will actually do what users want, not just what the IS management thinks is wanted by the users! Thus, IS planning aids communication between users, IS staff and top management.

IS planning provides a basis for performance assessment. It is not, after all, possible to measure achievement unless there is something (a plan) to measure against it!

IS planning may also raise the awareness of IS potential throughout the organization, and also increase IS staff awareness of the business.

IS planning might also provide financial benefits to the organization and improve its performance. A research study has identified that companies with well-integrated IS strategic plans and business plans outperformed companies that had no such plans by a factor of 6 to 1.

Predicting the future is a difficult task, and IS planning might not identify all IS needs. It will also require regular revision and re-evaluation, as stated

in the earlier section. Like business planning, then, the most important benefit of IS planning is that it puts the organization in a better position to react to unforeseen events.

One study conducted a survey of the top 300 companies in Ireland to study the nature of IS planning undertaken by these firms. The survey results identified the following benefits of IS planning:

Table 4.3: Benefits of IS strategic planning (Ireland)

Benefit	Percentage of Organizations Currently Enjoying the Benefit
Major one-time IS projects can be often justified	71.4%
A basis for IS budgeting is provided	70.5%
General management becomes informed and involved concerning IS activities	61.0%
Scarce IS resources can be allocated wisely	55.2%
Business programmes are assured of needed IS help	52.4%
Strategy for selection of IS can be set	49.5%
Performance of IS activity can be measured fairly	39.0%
Emergency IS projects are often avoided	29.5%

It might be interesting to compare these results with study of 21 large UK based organizations in which the respondents also identified the following benefits of IS strategic planning in the rank order as given in Table 4.4.

Table 4.4: Benefits of IS Strategic Planning (UK)

Rank Order	**Benefits of IS Strategic Planning**	**No. of Respondents (Out of 63)**
1	Aligning IS with business needs	49
2	Top management support	27
3	Better priority setting	35
4	Competitive advantage applications	21
5	Top management involvement	19
6	User/ line management involvement	21

There has not been a published study of this nature in Hong Kong so far, though perhaps some research in this direction is underway at present. However, an exploratory study conducted by Rebecca Low et al. IS planning practices in nine organizations in Hong Kong and stated the following benefits of IS planning as identified by the respondents:

Table 4.5: Benefits of IS Strategic Planning (HK)

Benefit	Percentage of Respondents (Out of 9)
Provides a basis for budgeting	87.5%
Scarce IS resources are allocated wisely	75%
General management becomes informed and involved in IT	75%
Supports business strategy	50%
Crash IS projects can be avoided	37.5%
A strategy for selection of IS can be set	25%
Performance of IS can be measured wisely	25%

It seems that some identified benefits are common to most of the planning studies but some are not. However, IS planning being not a stable process when the business environment changes constantly. IS planners should consider a number of issues.

- Planning is a resource drain · management should be careful not to treat IS planning as a routine deployment of financial and human resources. As technologies change as well as the business environment, good IS planning could leave extra resources to other projects in the organization.
- Corporate culture matters · tall management hierarchies often prefer formal and top-down planning processes. Corporate cultures may also affect commitment of the senior management.
- Strategic impact of IT activities · innovative applications of IT are of significant strategic importance to businesses. However, the benefits of the IS plan might not be realized unless it is implemented with the right kind of readiness. Sometimes, both individual and corporate habits need to change.

Organizations should not, therefore, expect too much from IS planning in

its initial phase; i.e. the first one or two years. Rather, they should consider this period as a learning experience and be content with only the intangible benefits.

IS planning provides many benefits depending on the effort spent on the IS planning process and past experience of IS planning. IS strategic planning having a learning effect. Initially, during the first one or two years, organizations may get only soft benefits, which are hardly related to business strategy. However, after about four to five years' experience in IS planning, organizations may start getting direct or hard benefits.

4.6 WHAT MAKES A GOOD IS PLANNER?

The success of an IS planning exercise very much depends upon the quality of IS planners within the planning team. Current university education curricula in IS have been criticised as incapable of producing qualified, employable IS professionals. Thus, it is hard to find fresh graduates who could do a good job of IS planning without some sort of training within or outside the organization. Though suggesting how you go about becoming an IS planner is difficult, it is possible to identify some of the desirable attributes an IS planner should possess. Head, who has extensively worked as a consultant in the IS strategic planning area, suggests some of the attributes, which are described below (Head 1984, 151):

- Affinity for strategic thinking. This is a somewhat intangible quality that only a few people in IS departments seem to possess. Most of them are pre-occupied with specific technical tools, techniques and problems. But this attribute is essential if you are to focus on a global or macro-view of what IS capabilities should be introduced into the organization over the next five to 10 years.
- Company loyalty. IS professionals have become somewhat notorious for their job-hopping activities. From the standpoint of doing effective IS planning, it is difficult to give such planning both enthusiasm and undivided attention if you are fairly certain that he or she will not be around to see strategic (long-range) plans come to fruition.
- Self-starting ability. Some organizations follow top-down IS planning, in which IS plans are governed by overall business plans, whereas others follow bottom up IS planning, in which IS plans are initiated by the IS department and sent up the hierarchy for top management review and approval. As the bottom-up approach is more common in practice, the IS planners must have the ability to take the initiative in

structuring a plan in the absence of clear-cut guidelines from the top. This can involve stepping outside the IS arena by hypothesizing business goals and objectives, documenting assumptions about the business environment, and relating these to technological capabilities.

- Communications skills and Salesmanship. A common failure in IS planning lies in the inability to communicate IS problems and objectives to top management to gain the commitment of resources needed to implement effective strategies. It is crucial, therefore, for IS planners to be able to transform technical problems and requirements into both written and oral communications that are understandable to top management.
- Background in accounting, forecasting and quantitative methods. IS plans, like business plans, require collection and analysis of large amounts of quantitative data, extrapolations based on such data, and trend analysis. IS planners with this kind of experience may have a head start in many important aspects of IS planning.
- IS background. Because IS planning addresses a highly volatile and complex technology, a key attribute of an IS planner is knowledge of IT. Technology assessment, one of the important components of IS planning, cannot be done without good insight into the present state of IT and its likely future developments.

There is a chief information officer (CIO) in many organizations today to lead IS planning and its implementation processes. The CIO plays a number of key roles in IT management of an organization. To understand the challenges that a CIO faces, study the following chapter.

Note that the role of the CIO as a person to formulate business strategies is mentioned. You should see new roles are being added as Web business (from where issues such as networks, reintegration, customer service, enterprise infrastructure, sourcing and alliances emerge) becomes a necessity to many organizations.

SUMMARY

In this topic you studied Nolans stage theory, the notion of extended enterprises, the meaning of IS planning, and its historical evolution and importance.

This topic introduced the stage theory as the basis by which we could compare information system strategies. We discussed the various stages and argued that many organizations (especially those extended

enterprises) were now ready to enter the data administration stage. This is the stage at which organizations need to reconstruct their corporate database and inter-organizational ISs. This is one of the competitive advantages that businesses can get in e-commerce.

When we came to the objectives of IS planning, however, we need to understand the corporate objectives, the level of IS plans, and the dynamic nature of the planning process. Although it was not the aim of this topic to introduce IS planning methodologies, you were introduced to the benefits of IS planning, and the last section exposed you to the desirable attributes for a good IS planner.

In topic 5 you will study IS strategic planning process in detail. You will also be exposed to IS strategic frameworks that can help to transform business strategy into IS strategy.

GLOSSARY

The purpose of this glossary is to offer concise explanations or definition of terms that have either been introduced or considered in detail in this topic. You may refer to the glossary whenever you come across a term that you are not familiar with.

IS operational planning	·	The process of developing specific detailed plans for each IS project.
IS planning	·	The broadly based management activity that provides direction, within an organizational setting, for the development and use of IST. It involves establishing IS goals to support business goals, identification of IS and associated resources necessary to support the achievement of these goals, establishment of priorities, schedules and budgets, and the management of specific IS development efforts.
IS processes	·	Work processes central to IS operations such as system development, maintenance, etc.
IS skills	·	Acquisition and development of IS staff.
IS strategic planning	·	The process of ensuring alignment between business plans and objectives and IS plans and objectives and/or the process of identifying IS applications that will provide the organization with a competitive edge.

IS tactical planning	·	The process of prioritizing and scheduling IS development efforts and establishing action plans for development and performance measures to be used during IS operational planning.
IT scope	·	The specific information technologies (such as LANs, WANs, etc.) that support current business strategy initiatives or could shape new business strategy initiatives.
Information Management (IM) strategy	·	Strategy concerned with the role and structure of IT activities in the organization.

5 INFORMATION SYSTEM TYPES AND PLANNING

INTRODUCTION

Improved strategic IS planning is one of the critical issues facing IS executives today. Effective strategic IS planning can help organizations use IT to reach business goals. It can also enable organizations to use IT to significantly impact their strategies. However, if you don't carry out strategic IS planning carefully, the results will include both lost opportunities and the waste of expensive IT resources. In order to perform strategic IS planning effectively, organizations apply one of several planning methodologies. A methodology should use a collection of postulates, rules, and guidelines that provide a standard proven process to follow. The importance of using a methodology is that Knowledge organized in a discipline does a good deal for the merely competent; it endows him with some effectiveness. It does infinitely more for the truly able; it endows him with excellence.

In this topic, we describe some of the conventional IS planning methodologies that have developed over the past 20 years. We include a selection of the three most representative and best-known methodologies used for IS planning: critical success factors, business systems planning, and the multiple methodology. Our aim here is not to examine all the existing methodologies in detail; rather it is to show you the underlying assumptions and circumstances. You also identify a number of weaknesses and omissions viewed in the context of the question: is a methodology complete and how does it link business strategy and IS strategy? In this context, and IS planning methodology is considered complete if it can help a planner in identifying only the IT opportunities the method intends to account for.

5.1 TYPES OF INFORMATION SYSTEMS

An information system is a collection of hardware, software, data, people and procedures that are designed to generate information that supports the day-to-day, short-range, and long-range activities of users in an

organization. Information systems generally are classified into five categories: office information systems, transaction processing systems, management information systems, decision support systems, and expert systems. The following sections present each of these information systems.



Figure 5.1: Information Systems

1. Office Information Systems

An office information system, or OIS (pronounced oh-eye-ess), is an information system that uses hardware, software and networks to enhance work flow and facilitate communications among employees. Win an office information system, also described as office automation; employees perform tasks electronically using computers and other electronic devices, instead of manually. With an office information system, for example, a registration department might post the class schedule on the Internet and e-mail students when the schedule is updated. In a manual system, the registration department would photocopy the schedule and mail it to each student's house.

An office information system supports a range of business office activities such as creating and distributing graphics and/or documents, sending messages, scheduling, and accounting. All levels of users from executive management to no management employees utilize and benefit from the features of an OIS.

The software an office information system uses to support these activities include word processing, spreadsheets, databases, presentation graphics,

e-mail, Web browsers, Web page authoring, personal information management, and groupware. Office information systems use communications technology such as voice mail, facsimile (fax), videoconferencing, and electronic data interchange (EDI) for the electronic exchange of text, graphics, audio, and video. An office information system also uses a variety of hardware, including computers equipped with modems, video cameras, speakers, and microphones; scanners; and fax machines.

2. Transaction Processing Systems

A Transaction Processing System (TPS) is an information system that captures and processes data generated during an organization's day-to-day transactions. A transaction is a business activity such as a deposit, payment, order or reservation.

Clerical staff typically perform the activities associated with transaction processing, which include the following:

1. Recording a business activity such as a student's registration, a customer's order, an employee's timecard or a client's payment.
2. Confirming an action or triggering a response, such as printing a student's schedule, sending a thank-you note to a customer, generating an employee's paycheck or issuing a receipt to a client.
3. Maintaining data, which involves adding new data, changing existing data, or removing unwanted data.

Transaction processing systems were among the first computerized systems developed to process business data – a function originally called data processing. Usually, the TPS computerized an existing manual system to allow for faster processing, reduced clerical costs and improved customer service.

The first transaction processing systems usually used batch processing. With batch processing, transaction data is collected over a period of time and all transactions are processed later, as a group. As computers became more powerful, system developers built online transaction processing systems. With online transaction processing (OLTP) the computer processes transactions as they are entered. When you register for classes, your school probably uses OLTP. The registration administrative assistant enters your desired schedule and the computer immediately prints your statement of classes. The invoices, however, often are printed using batch

processing, meaning all student invoices are printed and mailed at a later date.

Today, most transaction processing systems use online transaction processing. Some routine processing tasks such as calculating paychecks or printing invoices, however, are performed more effectively on a batch basis. For these activities, many organizations still use batch processing techniques.

3. Management Information Systems

While computers were ideal for routine transaction processing, managers soon realized that the computers' capability of performing rapid calculations and data comparisons could produce meaningful information for management. Management information systems thus evolved out of transaction processing systems. A management information system, or MIS (pronounced em-eye-ess), is an information system that generates accurate, timely and organized information so managers and other users can make decisions, solve problems, supervise activities, and track progress. Because it generates reports on a regular basis, a management information system sometimes is called a Management Reporting System (MRS).

Management information systems often are integrated with transaction processing systems. To process a sales order, for example, the transaction processing system records the sale, updates the customer's account balance, and makes a deduction from inventory. Using this information, the related management information system can produce reports that recap daily sales activities; list customers with past due account balances; graph slow or fast selling products; and highlight inventory items that need reordering. A management information system focuses on generating information that management and other users need to perform their jobs.

An MIS generates three basic types of information: detailed, summary and exception. Detailed information typically confirms transaction processing activities. A Detailed Order Report is an example of a detail report. Summary information consolidates data into a format that an individual can review quickly and easily. To help synopsize information, a summary report typically contains totals, tables, or graphs. An Inventory Summary Report is an example of a summary report.

Exception information filters data to report information that is outside of a normal condition. These conditions, called the exception criteria, define the range of what is considered normal activity or status. An example of an exception report is an Inventory Exception Report is an Inventory Exception Report that notifies the purchasing department of items it needs to reorder. Exception reports help managers save time because they do not have to search through a detailed report for exceptions. Instead, an exception report brings exceptions to the manager's attention in an easily identifiable form. Exception reports thus help them focus on situations that require immediate decisions or actions.

4. Decision Support Systems

Transaction processing and management information systems provide information on a regular basis. Frequently, however, users need information not provided in these reports to help them make decisions. A sales manager, for example, might need to determine how high to set yearly sales quotas based on increased sales and lowered product costs. Decision support systems help provide information to support such decisions.

A Decision Support System (DSS) is an information system designed to help users reach a decision when a decision-making situation arises. A variety of DSSs exist to help with a range of decisions.

A decision support system uses data from internal and/or external sources.

Internal sources of data might include sales, manufacturing, inventory, or financial data from an organization's database. Data from external sources could include interest rates, population trends, and costs of new housing construction or raw material pricing. Users of a DSS, often managers, can manipulate the data used in the DSS to help with decisions.

Some decision support systems include query language, statistical analysis capabilities, spreadsheets, and graphics that help you extract data and evaluate the results. Some decision support systems also include capabilities that allow you to create a model of the factors affecting a decision. A simple model for determining the best product price, for example, would include factors for the expected sales volume at each price level. With the model, you can ask what-if questions by changing one or more of the factors and viewing the projected results. Many people use

application software packages to perform DSS functions. Using spreadsheet software, for example, you can complete simple modelling tasks or what-if scenarios.

A special type of DSS, called an executive information system (EIS), is designed to support the information needs of executive management. Information in an EIS is presented in charts and tables that show trends, ratios, and other managerial statistics. Because executives usually focus on strategic issues, EISs rely on external data sources such as the Dow Jones News/Retrieval service or the Internet. These external data sources can provide current information on interest rates, commodity prices, and other leading economic indicators.

To store all the necessary decision-making data, DSSs or EISs often use extremely large databases, called data warehouses. A data warehouse stores and manages the data required to analyse historical and current business circumstances.

5. Expert Systems

An expert system is an information system that captures and stores the knowledge of human experts and then imitates human reasoning and decision-making processes for those who have less expertise. Expert systems are composed of two main components: a knowledge base and inference rules. A knowledge base is the combined subject knowledge and experiences of the human experts. The inference rules are a set of logical judgments applied to the knowledge base each time a user describes a situation to the expert system.

Although expert systems can help decision-making at any level in an organization, no management employees are the primary users who utilize them to help with job-related decisions. Expert systems also successfully have resolved such diverse problems as diagnosing illnesses, searching for oil and making soup.

Expert systems are one part of an exciting branch of computer science called artificial intelligence. Artificial Intelligence (AI) is the application of human intelligence to computers. AI technology can sense your actions and, based on logical assumptions and prior experience, will take the appropriate action to complete the task. AI has a variety of capabilities, including speech recognition, logical reasoning, and creative responses.

Experts predict that AI eventually will be incorporated into most computer systems and many individual software applications. Many word processing programs already include speech recognition.

- Integrated Information Systems

With today's sophisticated hardware, software and communications technologies, it often is difficult to classify a system as belonging uniquely to one of the five information system types discussed. Much of today's application software supports transaction processing and generates management information. Other applications provide transaction processing, management information, and decision support. Although expert systems still operate primarily as separate systems, organizations increasingly are consolidating their information needs into a single, integrated information system.

Computer-based Information Systems (IS) use hardware, software, the Internet, and other telecommunications networks, computer-based data resource management techniques, and other forms of Information Technologies (IT) to transform data resources into a variety of information products for consumers and business professionals.

A system (sometimes called a dynamic system) has three basic interacting components or functions.

These include:
- Input involves capturing and assembling elements that enter the system to be processed.
- Processing involves transformation processes that convert input into output.
- Output involves transferring elements that have been produced by a transformation process to their ultimate destination.

Two additional components of the system concept include feedback and control. A system with feedback and control components is sometimes called a cybernetic system, that is, a self-monitoring, self-regulating system.

- Feedback is data about the performance of a system.
- Control involves monitoring and evaluating feedback to determine whether a system is moving toward the achievement of its goals. The

control function then makes necessary adjustments to a system's input and processing components to ensure that it produces proper output.

5.2 SYSTEM CHARACTERISTICS

A system does not exist in a vacuum; rather, it exists and functions in an environment containing other systems.

Subsystem: A system that is a component of a larger system, where the larger system is its environment.

System Boundary: A system is separated from its environment and other systems by its system boundary.

Interface: Several systems may share the same environment. Some of these systems may be connected to one another by means of a shared boundary, or interface.

Open System: A system that interacts with other systems in its environment is called an open system

Adaptive System: A system that has the ability to change itself or its environment in order to survive is called an adaptive s.

Components of an Information System:
An information system model expresses a fundamental conceptual framework for the major components and activities of information systems. An information system depends on the resources of people, hardware, software, data, and networks to perform input, processing, output, storage, and control activities that convert data resources into information products.

The information systems model outlined in the text emphasizes four major concepts that can be applied to all types of information systems:

- People, hardware, software, data, and networks, are the five basic resources of information systems.
- People resources include end users and IS specialists, hardware resources consist of machines and media, software resources include both programs and procedures, data resources can include data and knowledge bases, and network resources include communications media and networks.

- Data resources are transformed by information processing activities into a variety of information products for end users.
- Information processing consists of input, processing, output, storage, and control activities

5.3 INFORMATION SYSTEM RESOURCES

The basic IS model shows that an information system consists of five major resources:

- People resources
- Hardware resources
- Software resources
- Data resources
- Network resources

1. People Resources:

People are required for the operation of all information systems. These people resources include end users and IS specialists.

- End Users (also called users or clients) are people who use an information system or the information it produces. Most of us are information system end users. And most end users in business are knowledge workers, that is, people who spend most of their time communicating and collaborating in teams of workgroups and creating, using, and distributing information.
- IS Specialists being people who develop and operate information systems. They include system analysts, software developers, system operators, and other managerial, technical, and clerical IS personnel.

Systems analysts – design information systems based on the information requirements of end users. (example- LIB)

Software developers – create computer programs based on the specifications of systems analysts.

System operators – monitor and operate large computer systems and networks.

2- Hardware Resources:

Hardware resources include all physical devices and materials used in information processing.

- Machines- physical devices (computers, peripherals, telecommunications networks, etc.)
- Media - all tangible objects on which data are recorded (paper, magnetic disks etc.)

Examples of hardware in computer-based information systems are:

- Computer Systems – which consist of central processing units containing microprocessors, and a variety of interconnected peripheral devices.
- Computer peripherals – which are devices such as a keyboard or electronic mouse for input of data and commands, a video screen or printer for output of information, and magnetic or optical disks for storage of data resources.

3- Software Resources:

Software resources include all sets of information processing instructions.

- Program - a set of instructions that causes a computer to perform a particular task.
- Procedures - set of instructions used by people to complete a task.

Examples of software resources are:

- System software – such as an operating system program, which controls and supports the operations of a computer system. (e.g. Win, UNIX)
- Application software – are programs that direct processing for a particular use of computers by end users. (Word, Photoshop)
- Procedures – are operating instructions for the people who will use an information system.

4- Data Resources

Data versus Information. The word data is the plural of datum, though data is commonly used to represent both singular and plural forms. The term's data and information are often used interchangeably. However, you should make the following distinction:

Data: - are raw facts or observations, typically about physical phenomena or business transactions. More specifically, data are objective measurements of the attributes (characteristics) of entities, such as people, places, things, and events.

Information: - is processed data, which has been placed in a meaningful and useful context for an end user. Data is subjected to a "value-added" process (data processing or information processing) where:

- Its form is aggregated, manipulated, and organized.
- Its content is analyzed and evaluated
- It is placed in a proper context for a human user

Data constitutes a valuable organizational resource. Thus, data resources must be managed effectively to benefit all end users in an organization. The data resources of information systems are typically organized into:

- Databases - a collection of logically related records or files. A database consolidates many records previously stored in separate files so that a common pool of data records serves many applications.
- Knowledge Bases - which hold knowledge in a variety of forms such as facts and rules of inference about various subjects.

5- Network Resources

Telecommunications networks like the Internet, intranets, and Extranets have become essential to the successful electronic business and commerce operations of all types of organizations and their computer-based information systems. Telecommunications networks consist of computers, communications processors, and other devices interconnected by communications media and controlled by communications software. The concept of **network resources** emphasizes that communications networks are a fundamental resource component of all information systems. Network resources include:

- Communications media (twisted-pair wire, coaxial cable, fiber-optic cable, and microwave, cellular, and satellite wireless systems.
- Network support (people, hardware, software, and data resources that directly support the operation and use of a communications network).

5.4 INFORMATION SYSTEM ACTIVITIES

Information processing (or data processing) activities that occur in information system include the following:

- Input of data resources
- Processing of data into information
- Output of information products

- Storage of data resources
- Control of system performance (based on feedback)

1- Input of Data Resources:
- Data about business transactions and other events must be captured and prepared for processing by the input activity. Input typically takes the form of data entry activities such as recording and editing.
- Once entered, data may be transferred onto a machine-readable medium such as magnetic disk or type, until needed for processing.

2- Processing of Data into Information:
- Data is typically subjected to processing activities such as calculating, comparing, sorting, classifying, and summarizing. These activities organize, analyze, and manipulate data, thus converting them into information for end users.
- Quality of data stored in an information system must be maintained by a continual process of correcting and updating activities.

3- Output of Information Products:
- Information in various forms is transmitted to end-users and made available to them in the output activity. The goal of information systems is the production of appropriate information products for end users. HIGH Q!

Information Quality:
What characteristics would make information valuable and useful to you?
- Examine the characteristics or attributes of information quality. Information that is outdated, inaccurate, or hard to understand would not be very meaningful, useful, or valuable to you or other end users.
- People want information of high quality, that is, information products whose characteristics, attributes, or qualities help make it valuable to them.
- Three dimensions of information are time, content, and form.

4- Storage of Data Resources:
Storage is a basic system component of information systems.

- Storage is the information system activity in which data and information are retained in an organized manner for later use.

5- Control of System Performance:

An important information system activity is the control of its performance.

- An information system should produce feedback about its input, processing, output, and storage activities.
- Feedback must be monitored and evaluated to determine if the system is meeting established performance standards.
- Feedback is used to make adjustments to system activities to correct deficiencies.

5.5 THE FUNDAMENTAL ROLES OF IS APPLICATIONS

Information systems perform three vital roles in any type of organization. That is, they support an organization's:

- Business processes and operations
- Decision making by employees and managers
- Strategies for competitive advantage

The roles given to the information systems function have expanded significantly over the years.

1950s - 1960s - Data Processing - Electronic data processing systems

Role: Transaction processing, record keeping, and accounting, and other Electronic Data Processing (EDP) applications

1960s - 1970s - Management Reporting – Management information systems

Role: Providing managerial end users with predefined management reports that would give managers the information they needed for decision-making purposes.

1970s - 1980s - Decision Support - Decision support systems

Role: The new role for information systems was to provide managerial end users with ad hoc support of their decision-making process. This support would be tailored to the unique decision-making styles of managers as they confronted specific types of problems in the real world.

1980s - 1990s - Strategic and End User Support

Role: End users could use their own computing resources to support their

job requirements instead of waiting for the indirect support of corporate information services departments.

1990s - 2000 – Electronic business and commerce systems

Role: The rapid growth of the Internet, intranets, Extranets, and other interconnected global networks has revolutionizing the operations and management of today's business enterprises.

5.6 THE E-BUSINESS ENTERPRISE

The explosive growth of the Internet and related technologies and applications is revolutionizing the way businesses are operated and people work, and how information technology supports business operations and end user work activities.

Businesses are becoming E-business enterprises. The Internet and Internet-like networks – inside the enterprise (Intranets), and between an enterprise and its trading partners (Extranets) – have become the primary information technology infrastructure that supports the business operations of many companies. E-business enterprises rely on such technologies to: they help:

- Reengineer and revitalize internal business processes.
- Implement electronic commerce systems among businesses and their customers and suppliers.
- Promote enterprise collaboration among business teams and workgroups.

E-business is defined as the use of Internet technologies to internetwork and empower business processes, electronic commerce, and enterprise communication and collaboration within a company and with its customers, suppliers, and other business stakeholders.

Enterprise collaboration systems involve the use of GroupWare tools to support communication, coordination, and collaboration among the members of networked teams and workgroups. An internetworked E-business enterprise depends on Intranets, the Internet, Extranets, and other networks to implement such systems.

Electronic commerce is the buying and selling, and marketing and servicing of products, services, and information over a variety of computer

networks. An internetworked E-business enterprise uses the Internet, intranets, Extranets, and other networks to support every step of the commercial process.

Developing Business/IT Solutions:
Developing information system solutions to business problems is the responsibility of many business professionals today. For example:

- As a business professional, you will be responsible for proposing or developing new or improved uses of information technology for your company.
- As a business manager, you will frequently manage the development efforts of information systems specialists and other business end users.

Managerial Challenges of Information Technology:
For managerial end users, the information systems function represents:
- A major functional area of business that is important to a business' success
- An important factor affecting operational efficiency, employee productivity and morale, and customer service and satisfaction.
- A major source of information and support needed to promote effective decision making by managers.
- An important ingredient in developing competitive products and services that give an organization a strategic advantage in the marketplace.
- A major part of the resources of an organization and its cost of doing business
- A vital, dynamic, and challenging career opportunity for many men and women.

5.7 IS STRATEGIC PLANNING

The essential requirement for effective IS planning is that the needs of the business should drive the planning for IS development and deployment. There are many methods that can be used for IS planning, but all of these methods strive to achieve this goal of integrating IS capabilities and planning with the business needs of the firm. Business planning is the process of identifying the goals, objectives, and priorities for the firm and of developing action plans for achieving these goals, objectives and priorities. IS planning being a part of business planning, and focuses on deploying the firm's IT resources and capabilities to facilitate the overall business plans for the firm.

You learned in the last topic that the perception of information systems changes over time. Nolans stage theory indicates that as organizations increase their investment on ISs, they would expect the ISs to improve the strategic advantage of the organizations. According to Nolans model, the ISs in most organizations have grown to Stage 4 (integration) and Stage 5 (data administration). Inevitably, strategic planning is commonly aimed at integrating various functional ISs in the organization based on a data administration architecture.

However, moving up the stages is easier said than done. These types of projects usually involve more than one department and require very strong support from the executive management. In the following reading, you'll find a brief discussion on how some of these plans fail. At the beginning, the authors discuss six socioeconomic factors that motivate organizations for IS strategy planning. Later, when they explain why strategy planning fails, they do not put the blame on rapid evolution of technology, lack of resources, or unknown user needs. Instead, they suggest that the real reasons for the failure are:

- Failure to tie technology to institutional mission and priorities
- Failure to get the right people on board
- Excessive focus on technical details
- Lack of suitable leadership

To ensure healthy strategy planning, the authors propose a so-called agile approach (steps are given in Table 5.1)

Table 5.1: Ten Steps in the Agile Approach to IS Planning

1	Review institutional objectives.
2	Establish a framework of strategic technology objectives.
3	Prioritize objectives.
4	Invite key group review.
5	Disseminate strategic technology framework.
6	Translate objectives into operational goals.
7	Discuss operational goals with key people.
8	Disseminate operational goals.
9	Enable continuous input.
10	Conduct retrospective assessment.

The so-called agile approach is just one of the methodologies that IS consultants might choose in strategic planning. In Table 5.1, you can see that the ten steps are clearly divided into two periods·

(1) Forming a framework of strategic objectives and
(2) Translating objectives to operational goals · with each period consisting of 4–5 steps in which group effort plays a very significant role. The title agile clearly suggests that the methodology needs to be flexible and to cater for opinions from all parties. Notice that although it is not explicitly spelt out in Table 5.1, the operational goals cannot be formulated without taking legacy systems into consideration.

The agile approach, along with many other planning methodologies, indicates that IS planning creates a lot of operational, technical, and political problems that are difficult to solve if the planning is not supported by the strategic level of management.

In the next three sections, you will study three methodologies that are classical examples of IS planning; they are CSF, BSP, and multiple methodology.

5.8 CRITICAL SUCCESS FACTORS ANALYSIS

Critical Success Factors (CSF) analysis, originally developed, can be applied to support both IS planning and requirements analysis. Critical success factors are the limited number of areas in which satisfactory results will ensure competitive performance for the individual, department, or organization. These are the few key areas where things must go right for the business to flourish and the manager's goals to be attained. Therefore, they represent those managerial or business areas that must be given special and continual attention to bring about high performance. CSFs include issues vital to an organizations current operating activities and to its future success. Because CSFs represent critical areas of activity, the managers of an organization should have the appropriate information to allow them to determine whether events are proceeding sufficiently well in each of these areas. The CSF analysis is designed to provide a structured method to help managers determine their CSFs and thus identify their information needs.

For a business, the CSFs relate to those aspects of the business that will ensure competitive performance. They are those characteristics, conditions, or variables that when properly sustained, maintained, or

managed can have a significant impact on the success of a firm competing in a particular industry. They differ greatly from one type of business to another; from one time to another; and from one state of environment to another. A CSF can be a characteristic such as price advantage, it can also be a condition such as capital structure or advantageous customer mix; or an industry structural characteristic such as vertical integration. Examples of CSFs for some industries are given in Table 5.2.

Table 5.2: Examples of CSFs

Industry	Examples of CSFs
Automobile industry:	Fuel economy Image Efficient dealer network Manufacturing cost control
Food processing:	Effective advertising Good distribution New product development
Life insurance company:	Development of agency personnel Advertising effectiveness Productivity of clerical operations Marketing strategy
Software house:	Product innovation Quality of sales and user literature Worldwide marketing and service Ease of use of products

CSFs also support the attainment of organizational goals. The planning process itself boils down to a list of crucial information and analyses that are not currently at hand, but which subsequent efforts of systems development could make available. The CSF concept fits nicely into the planning and control framework. That is, the control system must report on those success factors that are perceived by the managers as appropriate to a particular job in a particular company. The major focus of the CSF approach has been the top executives of an organization, although that CSFs can be useful at all managerial levels. The CSF approach does not attempt to deal with information needs for strategic planning. Data needs for this management role are almost impossible to pre-plan. The CSF method centres, rather, on information needs for management control, where data needed to monitor and improve existing areas of business can be more readily defined.

Characteristics of CSFs

CSFs are quite different from key performance indicators, which have been used in the past for IS planning. They are not a standard set of measures that can be applied to all organizations. Rather, they are specific to a particular situation at a particular time. They have diverse measures; some are evaluated with soft subjective measures, whereas some others may be evaluated through information not currently gathered in an explicit manner.

Most CSFs are internal, some are external. Internal CSFs relate to actions that can be taken within the organization, such as improving product quality or lowering inventory costs. External CSFs relate to factors in the outside world, such as company acquisitions or acquiring financing.

CSFs can also be categorized as monitoring and building. Monitoring CSFs involves the scrutiny of existing situations, such as monitoring the percentage of defective parts. Building CSFs is related to changes in the organization for future planning, such as improving the product mix. Managers who spend most of their time in control functions are concerned mostly with monitoring CSFs, whereas those who are concerned primarily with planning are concerned mostly with building CSFs. In general, most managers are concerned with a mix of building and monitoring CSFs.

Sources of CSFs

There are five primary sources of CSFs.

1. Industry based factors. Each industry has a set of CSFs that are determined by the characteristics of the industry itself. Each organization in the industry must pay attention to these factors. For example, in the automobile industry, styling, an efficient dealer organization, and tight control of manufacturing costs are important.
2. Competitive strategy, industry position, and geographic location. Each organization in an industry is in an individual situation, determined by its history and current competitive strategy. Differences in industry position, in geographic location, and in strategies can lead to different CSFs from one company to another in an industry. A small company in an industry must almost always be concerned about protecting its particular industry niche. Similarly, in an industry dominated by a single major firm, a CSF for all the other companies is to understand the leader's strategies and its probable impact. For example, IBMÊs strategy for marketing small computers

in itself became a CSF for all small computer manufacturers due to IBMÊs large market share in the small computer market. Likewise, the geographic positioning of an organization can also generate CSFs. For example, retail firms in rural areas may have transportation management as a CSF while for more urban firms this is less critical.

3. Environmental factors. Environmental factors are those areas over which an organization has little control. CSFs for various organizations may change due to environmental changes such as changes in the gross domestic product (GDP), fluctuations in the economy, and the demographic composition of the population. For example, the oil crisis in 1973 caused energy supply to be a CSF whereas now the concern about environment may cause environment friendliness of products to be a CSF.
4. Temporal factors. Organizational internal considerations often lead to temporal CSFs. They are areas of activity that are significant for an organization because they are below the threshold of acceptability at that time. For example, inventory control is generally not a CSF for a chief executive, but may become a very high level CSF under the circumstances of either very little or too much stock.
5. Managerial position. Each functional managerial position has a generic set of CSFs associated with it. For example, almost all manufacturing managers are concerned with product quality, inventory control, and cash control.

Hierarchical Nature of CSFs

We may view CSFs as in a hierarchy. Some relate to an industry as a whole; some to an organization; some to organizational units; and some to individual managers. The Bullen and Rock art paper describes this hierarchy in detail, and you must now turn your attention to it.

CSFs for the industry

↓

CSFs for the organization

↓

CSFs for the organizational unit

↓

CSFs for the individual managers

Figure 5.2: Hierarchy of CSFs

Let's just recap: industry CSFs affect each organization in the development of its strategy, objectives and goals. No organization can afford to develop a strategy that does not provide adequate attention to the principal factors that underlie success in the industry. In turn, the strategy, objectives and goals developed by a company lead to the development of a particular set of CSFs for an organization (organizational CSFs). Given its strategy and objectives, as well as other factors in its specific environment, each organization will develop a set of CSFs unique to its own circumstances.

In turn, organizational CSFs become inputs into a similar CSF determination process for each organizational unit. The analysis of sub-industry CSFs (where appropriate), organizational strategy, objectives, goals and CSFs, and its own strategy, objectives and goals, as well as environmental and temporal factors lead to a set of CSFs for each organizational unit.

Managers at each of the organizational levels will have an individual set of CSFs that depend heavily upon their particular roles and on temporal factors, and less heavily upon the industry and the environment.

Measuring CSFs

To measure is to know. CSFs must be measured in order to track the progress in achieving them. Such measures are only rarely provided by the traditional financial accounting systems; and may be provided only sometimes by cost accounting systems (often with some additional improvements in them). However, a large number of data needed to measure CSFs cannot be provided as a by-product of conventional transaction processing. It must be specifically collected from other sources, sometimes even from external sources. Even the internal sources for such data might be widely dispersed. For example, measures of CSFs such as comparative profitability of all products, bid profit margin as a ratio of profit on similar jobs, and risk assessment in contracts by examination of experience with similar customer situations, etc., requires access to data from a variety of sources.

A small proportion of CSFs require subjective assessment rather than being easily quantifiable. Some CSFs can have only soft measures. However, usually there is some means of creating numeric measures. Senior management is used to such situations and spends much time with subjective judgements and measurements. Therefore, they might

not have problems with subjective measures. Objective measures can often be found for some CSFs, but they may demand considerable creativity (and use of techniques such as brainstorming and lateral reasoning)! Some examples of such measures are given in Table 5.3 below:

Table 5.3: Measures of CSFs

Categories	Variables	Measures
Environmental variables	State of the economy	GDP or GNP
Marketing variables	Sales, sales bookings	
	Market share	
	Gross margin percentage of a product	
	Key account orders (orders from important customers)	
	Lost orders	
Promotional indicators	Renewal rate of magazine	subscriptions Direct mail response rate Coupon returns for advertisement
	New customers (for banks, newspapers, service organizations)	
	Owner body, i.e., number of people owning company's product in the industry.	
Production and logistics variables	Cost control	Output per labour-hour Overtime
	Capacity utilization	Sold time Billed hours or total professional hours (in professional organizations) Occupancy rate in hotels
	Backlog	
	Quality	Customer returns

	Yield	Amount of saleable product Raw material cost (may be a temporal CSF) On-time delivery
Asset management	Inventory	Inventory turnover Inventory write-offs
	A/C receivables:	Daye's sale on the books
	Investment return (for banks, insurance, where profitability depends on investments)	

CSF Analysis

There are three major uses of the CSF concept:

- To help an individual manager determine his or her information needs.
- To aid an organization in it IS planning process.
- To aid an organization in its organizational strategic planning process.

In this topic, you are concerned with the second use, which you'll consider in detail. This process is often referred to as critical success factors (CSFs) analysis.

The CSF analysis process involves a series of interviews conducted in two or three sessions. In the first session, the manager is asked his or her goals and the CSFs that underlie these goals. The second session focuses primarily on identifying specific measures and possible reports. Additional sessions are held to obtain agreements of the CSF reporting sequences, and then the information systems required to provide the reports are identified.

CSF analysis allows senior managers to articulate their needs in terms of the information that is absolutely critical to them. It can be applied lower down the management structure but it gets more and more difficult to articulate a few things that must go right the lower down one goes. This becomes particularly difficult for those many management layers that focus on gathering and filtering data for other parts of the organization. Some useful general guidelines on CSF analysis are given below:

- CSFs are very flexible, which can entice some organizations to be casual about their use. Casual application can provide false results. CSFs should be used with the same precision as formal methods.
- The person(s) managing the CSF analysis should have a thorough understanding of the organization's business. As with many other techniques, the real discriminator for success is going to be the skill of the team and the degree of high level commitment. IS and senior management that understand their common business goals would fit this guideline.
- It is helpful to have a senior management person to champion (support or stand up for) the CSF analysis project. This can motivate others in the organization to be more receptive to the project in the early stages.
- Educating staff members in CSF analysis before the actual interview is useful. A basic understanding of the concept and time to think before the first interview will make it more productive.
- Do not link to concrete things such as information needs, computer applications, etc., during the first round of interviews. Staff can be more productive and creative in identifying CSFs if their attention is directed away from current IS realities.
- Try to use several management levels in order to validate the CSFs and to get a broader picture and higher quality organizational CSFs.

CSF analysis has been widely used. Its purpose is to identify the most important ingredients for the IS strategy since they define the most important ingredients of the business success. CSFs keep a firm focus upon strategic issues, but obviously their weakness is that it needs very skilled and very perceptive interviewers to determine CSFs from senior managers. The main strengths of CSF analysis are that it provides effective support to planning since the consideration of critical activities develops management insights and CSF analysis may serve as the effective top level for a subsequent structured analysis. CSFs receive an enthusiastic welcome from senior management. In contrast, another major weakness of the approach is that the more removed from the management apex a specific manager is, then the harder it is to apply CSF analysis. Many managers who are not already involved in strategy planning activities find CSF analysis too conceptual. Additionally, it is usually impossible to build a true picture of an organizations information requirements using only CSF analysis.

Extended CSF Analysis

CSFs are time dependent. Thus even if the appropriate factors are

identified, events may alter the criticality of these factors. For example, the rise of crude oil prices in the 1970s caused major changes in various organizations. Similarly, the decline in oil prices in 1986 dramatically changed the CSFs of oil companies. For some oil companies, Corporate survival became a CSF in 1986. Henderson, a direct means to validate the proposed CSFs and to provide an Early warning mechanism to alert management to critical changes.

This extended CSF analysis method uses the CSF analysis to provide the planning context in three critical domains: information, decision and assumption. The critical information set (CIS) defines those measures and associated data necessary to monitor, analyse and control the CSFs. This is the traditional product of a CSF analysis.

The critical decision set (CDS) defines those decision processes that will most affect the successful achievement of a CSF. For example, if the CSF is to retain highly skilled employees, the CDS might include the hire, promotion, merit, raise, job assignment or other decisions that directly affect a highly skilled employee's decision to remain with the firm. Some other examples of critical decisions that may be associated with CSFs are:

- Determine appropriate debt and equity ratio.
- Determine optimal advertising and promotion expenditure.
- Determine areas of maximum competitive advantage.
- Determine maximum acceptable level of project risk.

While the critical information set (normally the major product of a CSF analysis) might include monitoring and control information, such as employee turnover rate, the CDS identifies decision processes that could be supported with a decision support system (DSS). A traditional process-based DSS analysis could be used to design a specific DSS. To the extent that the CSF is tightly linked to the goals and the goals are tightly linked to the business strategy, this DSS could have strategic impact on the organization. Thus, introducing a DSS planning exercise linked through CSF to a strategic IS planning process could allow management to systematically direct DSS investments toward Decisions that matter.

The concept of the critical assumption set (CAS) addresses the issue of beliefs. Each CSF has, underlying it, a set of assumptions about one's organization, competition, industry, and so on, that leads the individual to believe a particular factor is critical to success. For example, it was found

that the CSF of retaining highly skilled employees was based on the assumption that expert systems technology would not reduce the organization's dependency on a particular category of skilled employees. Some other examples of critical assumptions that may underlie CSFs are:

- Cash flow is the most significant restriction to growth.
- Acquisition is the primary path to growth for convenience stores.

Further, as the CSFs change with time, how do we examine or validate the appropriateness of the CSF? The process of surfacing and examining assumptions is a way for us to address the validation issue in a planning process. Here, CSFs provide an appropriate context for surfacing the critical assumptions of management in a strategic IS planning effort.

The set of underlying assumptions provides the backdrop for CSFs and the implied critical information set. Changes in these assumptions are a primary cause of changes in CSFs. If we analyse and monitor these assumptions, we can help to identify when CSFs and the subsequent IS plans require change. Given a critical assumption set, with further analysis we can define the requirements of an Executive Information System (EIS) which could monitor and analyse the status of these assumptions.

As you can see, the extended CSF analysis suggests that with a three-stage process we can identify the IS strategy. These steps are:

- Understanding the business strategy and goals.
- Identifying information needs using critical information, decision and assumption set and a high-level (strategic) data model.
- Ranking the IS/IT opportunities.

The strategic data model shows how we must combine sources of information, many of which currently exist, to provide the monitoring and analysis of a CSF. In practice, existing systems rarely are designed in a form directly capable of producing this critical information. Rather, we should extract the necessary information from the transaction processing system and, probably integrate it with data external to the organization. Some of this information could be Soft in nature, requiring subjective or expert opinion.

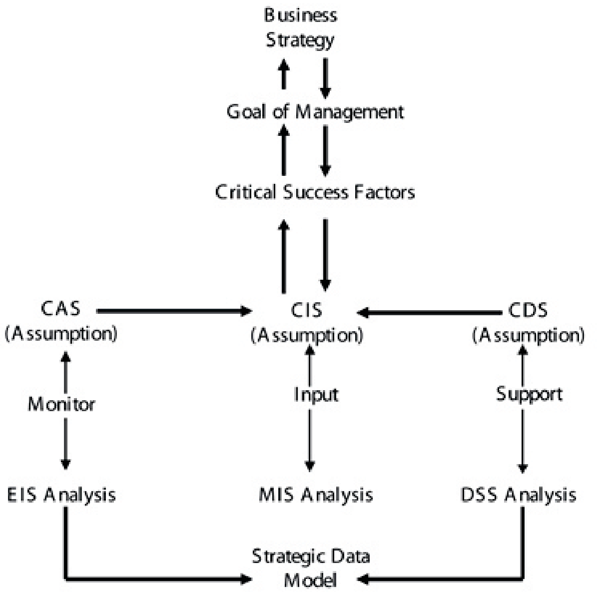


Figure 5.3: Extended CSF analysis (adapted from Robson 1997, 160)

The main strength of this approach is that it provides a comprehensive framework with which we can build and refine a strategic data model of the organization. This data model serves as a linking device between the strategic data needs of top management and the operational and technical needs of the IS organization.

Use of CSF Approach at Boeing

Since the late 1970s several organizations have been using the CSF approach as a strategic IS planning tool. To put it in context we look at a real example. The Boeing Military Airplanes (BMA) Support Division of Boeing Computer Services (BCS) has used this approach since 1983 and its experience provides insight into why the CSF concept is gaining in popularity.

BCS was established in the early 1970s as an operating company for developing and providing the computing and telecommunication resources and expertise needed to meet the Boeing Company's business objectives. BMA Support Division's mission is to directly contribute to Boeing's success. To achieve this, it provides a broad range of computing services including database management, engineering graphics, integrated logistics systems and traditional management information

systems.
Before 1983, BMA Support Division used a Management-by-objective (MBO) approach to planning. This process resulted in a detailed set of objectives for the next 12-month period. An action plan was developed for each objective · as well as the criteria used to measure the extent to which the objective was achieved. Using this approach, operating managers collectively identified 15 to 20 objectives that provided them with a sense of direction and a set of performance targets. However, as Boeing's business volumes increased, it became clear that the MBO approach did not provide the BMA Support Division with the strategic focus that it needed.

After considering various alternative approaches for better alignment of BMA Support Division's plans with corporate plans, it decided to adopt the CSF analysis. Management felt that this approach would provide Boeing with a systematic thought process that would force them to think about the business they were in and to develop a set of strategies for action that would positively impact performance. Their CSF analysis evolved into a six-step process:

- Re-assessing the mission of the firm in the context of the dynamic environment;
- Identifying the CSFs;
- Analysing the firm's strengths and weaknesses related to each CSF;
- Developing specific action plans for overcoming weaknesses and achieving each CSF;
- Implementing the action plans; and
- Reviewing actual performance after action plan implementation.

BMA Support Division has used this approach since 1984 and has no plans to abandon it. Many managers feel positively about the way it handles issues and state that the CSF approach promotes a team atmosphere, effective communication, and a common understanding of the organization and its strategic direction.

Annual performance assessments of BCS and the BMA Support Division have shown steady improvement since the CSF approach began. While the performance increases are not solely due to the CSF approach, many feel that it has been a major contributor. The entire BCS organization is now using the CSF analysis and its use is spreading to other parts of the Boeing Company.

Let us briefly summarize. CSFs are those characteristics, conditions or variables that when properly sustained, maintained or managed can have a significant impact on the success of an organization in a particular industry. Unlike key performance indicators, CSFs are not a standard set of measures that can be applied to all organizations. Rather they are specific to a particular organization in a particular situation at a particular time.

CSFs can be internal or external. They can also be seen as either monitoring, involving the scrutiny of existing situations, or building, when they are related to changes in the organization for future planning. They may arise from five primary sources: industry, organization· its competitive strategy, industry position and geographic location · environmental and temporal factors, and managerial position. Thus, CSFs may be thought of in a hierarchy · industry CSFs, organizational CSFs, CSFs for an organizational unit (or business unit) and CSFs for an individual manager.

CSFs need to be measured in order to track the progress in achieving them. Deciding what attributes could be used as a measure for a CSF could be difficult and may involve experience, judgement and creativity. Such measures may be based on hard facts but still need data which is not captured by the existing organizational information systems. Or the measures could be soft, based on subjective judgements.

The process of determining an organization's CSFs and their measures to aid it IS planning process is called CSF analysis. It involves a series of interviews and requires very skilled and perceptive interviewers to determine CSFs from senior managers.

CSFs might change with time and require a mechanism for their continuous validation, or otherwise an organization may continue tracking success factors that might not be critical anymore and ignore others which may at that time be critical! Extended CSF analysis has such a mechanism built into the method. It measures critical assumption sets which underlie CSFs, in addition to critical information sets which the traditional products of a CSF analysis, and the critical decision sets that will most affect the successful achievement of a CSF. Since the late 1970s, several organizations have been using the CSF approach as a strategic IS planning tool.

5.9 BUSINESS SYSTEMS PLANNING

Business systems planning (BSP) is an IBM proprietary technique devised initially for IBM internal use; later it was sold as a service to its customers in the mid-1970s. BSP was perhaps the earliest formal IS planning method and is now the most widely known. In fact, a number of firms use methods which are similar to BSP. For example, Arthur Andersons METHOD/1 and Martins Information Engineering are predominant methods which are similar to BSP.

BSP offers a structured approach to IS planning via a number of fairly rigorously defined stages that lead from the identification of business processes to a definition of required data structures. Data are tracked as they flow throughout the organization by the business activity support or from which they result.

The objectives of BSP are:

- To translate business strategy into IS strategy (as shown in Figure 5.4).
- Impartially determining IS priorities.
- Planning long-life information systems based on enduring business processes.
- Managing IT resources to support business goals.
- Assigning IT resources to high-return projects.
- Improving relationships between the IS department and users by providing systems that meet their requirements.
- Improving understanding of the need for IS planning.



Figure 5.4: Translating business strategy into IS strategy

Top-down planning and bottom-up implementation. The major premise of BSP is that organization-wide information systems should be planned from the top-down and implemented piece-by-piece from the bottom-

up. Top-down planning employs a study team consisting of managers, professionals, and IT experts with the broad strategic objectives of an organization, as well as other important information. The study team systematically decomposes them into an IS architecture that will support the organization's strategy. Once this architecture has been defined, the bottom-up implementation of specific IS applications is carried out by the IS department and the organization's users. Bottom-up implementation involves the users in operational decisions about new systems. Top-down planning establishes a sequence of implementation consistent with both long- and short-term issues. The combination of top-down planning and bottom-up implementation enables the organization to select IS projects with the highest payoffs and implement them with the full support of their future users, thus ensuring the best use of the organization's limited IS resources.

Figure 5.5 shows how the business mission determines business objectives, which in turn establishes functions and processes. The processes determine the required data, which forms the basis for an architecture of information systems and subsystems. The architecture determines computer databases containing the required data to be processed by the appropriate IS applications (such as accounting, marketing, etc.). The IS applications serve the functions that support the objectives and the organization's mission.

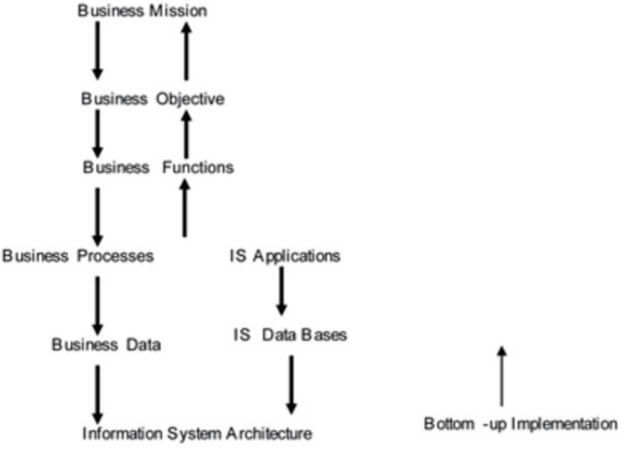


Figure 5.5: Top-down planning with bottom-up implementation

Major Activities in BSP

The BSP methodology consists of four major activities:

- documenting the business activities
- defining the business processes
- defining the data necessary to support the business processes
- defining the information architecture.

Documenting the business objectives. This activity entails determining business direction so that the IS strategy can support it. Figure 4.4 illustrates the way in which the IS strategy is derived from the business strategy.

Defining the business processes. This activity is undertaken to identify business processes, which are defined as groups of logically related decisions and activities required to manage the resources of the business. This is important because it establishes the prime long-term basis for IS support in the organization.

Defining the data necessary to support the business processes. This activity involves identifying the information elements that are basic to the organization and that will not change unless the organization changes. These information elements are called business process support data because business processes identified during the previous activity use them.

Defining the information architecture. This final activity refers to relating the business processes to the appropriate business process support data. This activity reveals the relationships between business areas and the associated data to be managed. Thus, the relationships define an information architecture of individual IS application modules, which can be assigned priorities and built as scheduled in the IS plan.

BSP Study Steps

There are 13 major steps to perform in carrying out a BSP:

1. Gaining executive commitment
2. Preparing for the study
3. Starting the study
4. Defining business processes
5. Defining business entities and data classes
6. Analysing current IS support
7. Determining the executive perspective

8. Defining findings and conclusions
9. Defining the information architecture
10. Determining architectural priorities
11. Reviewing information resource management
12. Developing recommendations and an action plan
13. Reporting results

Steps 1 and 2 precede the study itself. All the steps are important, and although some can be carried out to varying degrees, none can be completely eliminated.

1. Gaining executive commitment. A BSP study must not begin without a commitment from a top executive sponsor. In addition, other executives must be willing to become involved in it. Success depends on the degree to which these executives can supply the study team with their views of the organization and its data needs. A key part of this first step is the concurrence of all parties regarding the study's purpose and scope. Differing expectations are common and can lead to disappointing results and unmet expectations. Furthermore, the purpose of the study is to commit the organization to a course of action based on recommendations made at the study's end; therefore, early expectations are critical.
2. Preparing for the study. All executives on the study team should be provided with proper orientation. Everyone should know the BSP plans and procedures before the study is conducted so that the executive can provide optimal input and the study team can make optimal use of the input. Study team interviewees should be identified as soon as possible so that their interviews can be scheduled. Information on the organization's basic business functions and its current IT configuration should be compiled during this phase to facilitate the team training and orientation. The team should be given exclusive use of a conveniently located control room, where study activities can be conducted. By the end of this phase, the team should produce a study control book containing:

- A study work plan
- An interview schedule
- A schedule for reviews with the executive sponsor at certain checkpoints
- An outline of the final study report
- Business and IS data analysed, charted, and ready for use in the study.

The executive sponsor should review the accomplishments made during this phase before actually beginning the study.

3. Starting the study. The BSP study begins with three presentations to the study team:

- The executive sponsor repeats the purpose of the study and its anticipated output.
- The team leader reviews business facts already collected so that each team member is thoroughly up-to-date.
- The senior IS executive discusses the departments recent activities and problems so that study team members understand its current role in the organization.

4. Defining business processes. This is the most important phase of the BSP study. In this phase, the study team identifies the business processes which form the basis for the executive interviews, the definition of the future information architecture, and various other subsequent study activities. A business process relates to a specific act that has a definable start and stop. A process has identifiable inputs and outputs. A process is not based on organizational structures, and it identifies what is done, not how. Often the name of a process begins with an action verb such as: Create purchase requisition, select supplier, follow-up order, Analyse supplier performance (see Table 5.4).

This step is important because failure to define the process properly will be reflected in all that follows. During this step, team members record a list of the business processes, highlighting the most significant ones. In view of the importance of this step, you must have a thorough understanding of business process definition. You should, therefore, read the relevant portion of the BSP manual now to understand this step in detail.

Table 5.4: Examples of Processes Groups and Processes by Industry

Processes common to many businesses Policy and Goals Establish Corporate Policy Develop Goals Determine Product Cost Control Operations	Facilities Management Acquire Capital Equipment Maintain Facilities and inventory Production Planning Plan Production Capacity Allocate Production Capacity Schedule Production Plan Material Requirements

Marketing Planning Conduct Marketing Research Analyse Market Place Forecast Product Establish Sales Objectives Price Product Advertise and Promote Product	Processes in the Health Care(Hospital) Industry Health Care Delivery Admit Patient Determine Patients Health Status Determine Required Tests and Treatments Order and Schedule Diagnostic Studies, Treatments and Re-evaluations Perform and Report Diagnostic Studies Administer and Record Treatments Provide Necessities and Amenities Evaluate Care Interface with Referring Physician Discharge Patient
Personnel Planning Establish Personnel Policies Develop Personnel Programmes Determine Personnel Requirements Determine Training Requirements Determine Personnel Development Needs	Product Planning, Development, Manufacture and Distribution Develop Technology Develop Product Track Product Performance Manage Plant Operations Manufacture Product Distribute Product
Financial Planning and Control Forecast Cash Requirements Forecast Capital Requirements Forecast Profitability Analysis Create Budget Prepare Financial Alternatives Acquire and Manage Funds Control Finances	Sales Sell Product Develop New Business Service Policyholders
Cyclical Planning Establish five-year Business Plan Develop Annual Operating Plan Develop Quarterly Operating Plan	Customer Order Control Entry and Control Customer Order Service Customer Order Invoice Customer

Financial Operations
Analyse and Report Financial Performance
Manage Risk
Manage General Accounts
Purchase Supplies/Equipment/Raw Materials

Facilities Planning Determine Facility Requirements
Establish Facility Acquisition Policies

Management Support
Provide Legal Support
Maintain Stockholder Relations
Comply with Government Regulations Maintain Public Relations
Processes in the Insurance Industry (Group Life) Product Development
Monitor Regulatory / Legislative Activity
Develop Product
Price Product
Establish Dividend Formula

Marketing Support
Prepare Prospect Proposal Underwrite Policy
Issue and Maintain Policy

Product Administration
Maintain Employee Life File Pay Claim
Manage Claims Accounting
Bill and Collect Premium
Analyse and Report on Premiums / Claims
Produce Dividend

General Administration
Calculate Compensation
Calculate and Pay Incentive Compensation
Managed Personal

Research(General) Develop Proposal
Approve Research Study Assign Resources
Budget Research Project

5. Defining business entities and data classes. During this phase, business entities and data classes and their relationships are identified. A

business entity is something of lasting interest to an organization · something which can be uniquely identified and about which the organization wishes to keep data. Entities may be internal or external to an organization, and can be categorized as one of the following: person, place, thing, concept, or event. For example, Job is an entity because it is a concept of interest to an organization.

A data class is a logical grouping of data related to entities that are significant to the organization. Data classes are identified in order to:

(a) determine data sharing requirements across processes;
(b) determine data that are necessary but either unavailable or insufficient for business use; and
(c) establish the groundwork for data policy formulation (including data integrity responsibility).

To enable assignment of responsibility for data integrity, data classes must be defined so that there is one and only one process that creates each data class.

In this step data are grouped into related data classes. The future IS architecture will include databases that would contain these data. The organization of these databases should minimize the need for future revisions of the architecture. Criteria for data categorization are the relationships of the data to the business processes identified in the fourth study phase. Charts (matrices) are used to reflect these relationships clearly. A detailed description of this step is given in the BSP manual, which you should read now.

6. Analysing current IS support. In this phase, the study team identifies how information systems currently support the organization. Final recommendations will be based partly on the environment. The team develops charts (matrices) showing organizational processes during this phase to facilitate and document its analysis. These activities help the team prepare for its executive interviews and aid in defining requirements for information support for the various organizational areas. A detailed description of this phase and the charts to be drawn is given in the BSP manual, which you should read now.
7. Determining the executive perspective. The major purpose of this phase of the study is to validate the understanding that the team has developed thus far. Another major purpose is to achieve the commitment and support of executives not yet deeply involved in the

study. Executive perspective is gained by conducting interviews with executives from the top levels of management. The executive interviews conducted during this phase are used to validate processes and data classes and provide the study team with the basic understanding of the business problems that the future IS architecture should solve. This phase is described in detail in the BSP manual, and it would be useful for you to read it now.

8. Defining findings and conclusions. The major objective of this phase is to confirm that the BSP study team understands the information provided by the executives. In this step, the study team develops categories of findings and conclusions, and then assigns previously identified problems to the categories. This classification becomes the basis for future recommendations. The details of this step are described in the BSP manual, which you should look at now.
9. Defining the information architecture. In this phase the BSP study team uses the business processes identified above in the fourth phase and the data classes identified in the fifth phase to design the databases of the future information architecture. Various charts (matrices) are prepared which show the relationship between business processes and data classes. The team also identifies major systems and subsystems and determines if some subsystems must be completed before others. An information architecture flow diagram is drawn which reflects the relationship of systems and subsystems. This is a very important step in BSP, and you should now look at the details given in the BSP manual.
10. Determining architectural priorities. It would be impossible in most organizations to implement the entire information architecture all at the same time. Therefore, the BSP team must set priorities developing information systems and databases that will make up the final architecture. In determining selection criteria, the team considers potential financial and non-financial benefits, the likelihood of success, and the extent of the organization's demand for each subsystem. The team sets priorities by listing the subsystems of the information architecture and using the criteria to rank each one. For details of this step, you should now refer to the BSP manual.
11. Reviewing information resource management. The objective of this phase is to ensure that the management of IT is under the direction and control of top management. A steering committee is established to set policy and control the function. The study team examines the current IS organization to find its strengths and weaknesses.
12. Developing recommendations. The BSP study recommendations centre on information architecture and information resource

management. They are made not only for information systems, subsystems, hardware, and software but also for adjustments to systems under development and to systems currently in production. Another major area of recommendation includes strengthening IS management with improved planning and control mechanisms identified in the previous step. An action plan reflects priorities and identifies the means of delivering the future information architecture.

13. Reporting results. The BSP study team completes its mission by preparing the BSP study report and preparing and delivering an executive presentation. A brief executive summary covers the purpose of the study, its methodology, its conclusions, and its recommendations. A more detailed and comprehensive report expands these topics. In addition, an oral presentation to executives should include the result reporting process. Potential topics to be included in the BSP study report are given in Table 5.5.

Table 5.5: Potential Topics for BSP Study Report

Executive Summary Report Purpose, scope and objectives Methodology and study team Findings and Conclusions Recommendations Action for follow-on activities	IS profile Hardware and software (chart) Operational and planned systems Data files (data bases) Major users
Detailed Report Purpose, Scope and Objectives Reasons for conduction study Level of organisation selected Objectives of the study team	Financial Budgets Justification and funding processes
Method of Study BSP concepts Overview of study approach Study team members	Findings and Conclusions Definition of data classes Relationship of data class to current systems (matrix) Relationship of data class to business processes (matrix) Analysis of current system support Process relationships (diagram) Process / organisation / system relationships (matrix) Application support of organisation (matrix) Application support of processes (matrix)

- Business Perspective External environment Economic, government, competition Technology, customers, suppliers Internal environment
- Policies, practices, constraints Business planning
- Goals, objectives, strategies
- Planning approach and horizons
- Measurements and controls Organisation
- Relationships (chart) Number of people
- Geographic distribution (map)
- Statement of Findings and Conclusion
- Objectives
- Organisation
- Planning
- Measurement and Control Operations
- Current IS support
- Recommendations

- Changes to current IS development projects Acceptance of information architecture
- Satisfying architecture priorities Sub-system packages
- End-user tools (information centre) Sub-system development Products/services
- Description, volume Markets, trends Industry position and industry trends Financial
- Statistics
- Revenue-profit trends (chart) Business processes List of process groups and processes
- IS Perspective
- Major charges to existing systems
- Management systems changes
- Changes in information resource management
- Action Plan for Follow-On Projects
- (For the above recommendations)
- Description(s) Deliverables
- Schedules
- Resource requirements
- Project control methods

Appendices

- External environment Technology, customers (users), vendors Internal environment
- Policies, practices, strategies
- Resources, project schedules
- Planning approach and horizons Organisation
- Relationships (chart) Numbers of people Geographic distribution (map of equipment terminals, etc.)
- Glossary of terms Key correspondence
- Interviewee list
- Narrative descriptions – processes
- Narrative descriptions – data classes
- Narrative descriptions – current Iss
- Problem analysis
- Supporting statistics

Evaluation of BSP

The major strength of BSP is its ability to involve top management in the study, providing improved communication among top management, users, and IS departments and an increased awareness of the long- and short-term capabilities and cost of information systems. The methodology is highly structured and well documented. Another major strength is the continued evolution and adaptation to the changing IT environment. The latest subset of BSP, called the Information Quality Analysis (IQA), is similar to BSP but takes considerably less time and is supported by an integrated set of computer programs.

Compared with the stages-of-growth approach, BSP is business-oriented, and not theory-driven. BSP recommendations derive from the construction of an empirical model of a particular business enterprise and its information sources. The most common criticism of BSP may be that the results of the BSP study are not easy to implement, because the study is not quickly translatable into the technical specifications that the IS department may require. Furthermore, the study depends greatly on the study team's skills and abilities. The approach is not sufficiently well-structured to be unaffected by human error, and business judgement is necessary in selecting the business processes critical for business performance, and in interviewing the managers. The approach of functional decomposition leads to a strong bias for operational data and systems (internally focused), neglecting strategic and qualitative aspects. The structuring of the future information architecture is mainly based on an analysis of the existing business processes and IS applications. Furthermore, while the definition of business processes gives BSP the potential to be a business impacting tool, the overall wrapping of the method ensures that it is inherently conservative and therefore it is most unlikely to do anything beyond produce data models of existing practices.

BSP is a general purpose methodology which aims to cover the waterfront of IS application opportunities, but the environment is excluded from the BSP study, which means the possible targets and opportunities areas for Strategic Information Systems (SIS) are not considered in the BSP study.

We now summarize. BSP is a structured approach to IS planning which identifies business processes of an organization and derives data structure definitions required to effectively support these processes. The major premise of BSP is that organizational information systems should be planned from the top-down and implemented piece-by-piece from the bottom-up.

There are four major activities in BSP: documenting business activities; defining business processes; defining the data necessary to support business processes; and defining the information architecture. These activities are carried out in 13 major steps in a BSP study.

BSP is a highly structured business-oriented methodology that makes recommendations by constructing an empirical model of the business enterprise and its information architecture. Unfortunately, its recommendations are not quickly translatable into the specifications of required IS applications. Further, the recommended information architecture is mainly based on analysis of existing business processes and IS applications and mostly neglects strategic and environmental aspects. Thus, BSP may only produce data models of existing business practices and ignore the possible targets and opportunity areas for SIS.

5.10 EARL'S MULTIPLE METHODOLOGY

The complexity of the problem the same way that contemporary IS practitioners did, and he proposed a very comprehensive methodology that provides a basis for analysing all IS planning. He highlights three issues:

1. clarification of the business needs and strategy in IS terms · what is the business strategy and what is the IS strategy;
2. evaluation of current IS provision and use · how to integrate legacy systems; and
3. innovation of new strategic opportunities afforded by IT · what are the operational goals.

Earls method is known as the Multiple methodology or Three-pronged methodology as he tackles his three issues from different angles · top-down, bottom-up, and inside-out respectively.

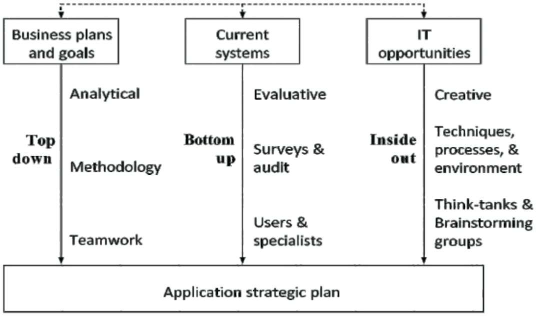


Figure 5.6: Earls multiple methodology

Figure 5.6 presents an overview of Earls methodology. In this section, well explain each of the three legs in the figure.

Top-Down Clarification

This is the process used to find out the corporate objectives and business strategies that affect the formulation of IS strategy. However, understanding business strategies is difficult because most organizations do not have their strategies or objectives written down, or even when you find some written statements, the business strategies are often ill-defined or are unrelated to IS development plans.

This top-down process should involve the top management or a delegation of senior executives. Commonly called a Steering committee, this group includes management from each department of the organization. Discussions and planning meetings should be conducted where tools like CSFs or the Scenario approach are applied to identify where IS can help in the business strategy.

Earl suggests a four-step process:

1. identification of corporate objectives · objectives of all business units should be solicited, agreed upon, and clearly stated;
2. determination of critical success factors · CSFs that are needed to achieve the agreed business objectives are suggested and determined after resolving conflicts among different business units;
3. decomposition to critical business processes · the CSFs that were identified are transformed into business processes that can be improved by Iss;
4. identification of IS and IT · details of the ISs to support those business processes and the underlying IT infrastructure are analysed and a development plan is decided.

Bottom-Up Evaluation

Earl argues that the bottom-up process is essential for the following reasons:

1. To find out the quality and capacity of the IS applications (legacy systems) currently being used in the organization.
2. To demonstrate to top management (the strength and the weakness of) the current IS status of the organization.
3. To identify components of the current ISs that can be improved for better strategic advantage by simple add-ons rather than a total renovation.

The evaluation process could lead to a systems audit grid like the one in Figure 5.7 below.

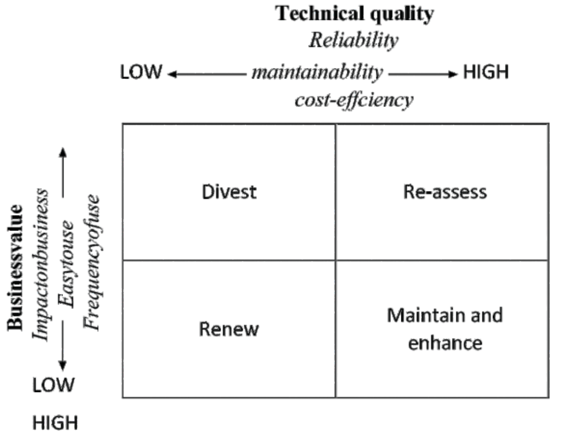


Figure 5.7: Systems audit grid

To classify ISs by the systems audit grid, you need to evaluate the technical quality and the business value of individual ISs. In each of the axes, you might ask three questions to determine the position of the IS:

Horizontal axis · How is the system in terms of its reliability, maintainability, and cost-efficiency?

Vertical axis ·
(a) how does the system impact on business; and
(b) how easy and how often is it used?

The grid also suggests that the ISs in it be divested, reassessed, renewed or enhanced according to where they are positioned. Often in cases of developing an ecommerce platform, many components of the current IS applications need to migrate to a Web-based system without making too many alternations. Therefore, the integration of legacy systems (plus legacy data) needs to be handled with care. For example, special procedures must be followed to guarantee that the integrity of the data would not be affected because of the migration.

Inside-Out Innovation

Earl suggests that people in committees, like in think tanks and brainstorming groups, are more likely to generate creative ideas by which the organization could discover market niches or innovative use of

information technology. These people might not be IT professionals. Their new ideas could seek support from leading IT vendors and would successfully be implemented if;

1. A project sponsor exists · they need to find someone who can support and provide the resources necessary to proceed to the new ideas.
2. A chance to test the idea · the idea can be experimented with without causing too much public alarm.
3. Tight management control · it is needed to ensure satisfactory installation, effective implementation and good integration with business practices.
4. IT capability gap bridged · the project team needs to deal with the knowledge or capability gap.

The three legs of Earls multiple methodology represent the three angles from which IS strategic planning can be considered on the inside of an organization. Earl also suggests that studying the IS strategy from an external point of view (e.g. competitors, customers, consumers, etc.) is essential. The SWOT method that you've learned in chapter 2 is a commonly used tool to uncover the IS strategic position from both internal and external perspectives.

5.11 CHOOSING METHODOLOGIES FOR IS PLANNING

The three methodologies that you've studied learned show you how IS planning methodology evolves through time. Although the methodologies currently face a number of criticisms · and they cannot be directly applied in today's business and technological environment without substantial modifications · the processes and the theories underlying these classical examples are still the basis of many modern methodologies. One such modern methodology is the agile approach that we mentioned earlier this topic. Now, you should understand some of the weaknesses of these IS planning methodologies.

Common Weaknesses of IS Planning Methodologies

Based on an extensive review of a variety of planning methodologies and techniques, a research described a number of problems that existed for virtually all IS planning methodologies in use by the mid-1990s. These problems are identified as either:

(a) recognized pitfalls that companies can avoid with good management practices and

(b) difficult problems for which there is no simple solution known today.

Poor Integration of Business and IS Planning:
All IS planning approaches are designed to facilitate linking business and IS planning, but this is still a serious problem for many companies implementing IS plans. This problem is most serious when a company is in the Strategic quadrant of the IT strategic grid. It can be a problem for almost all firms when there is a lack of communications between senior management and IS management to guide IS planning for operations and infrastructure investments.

Lack of Planning for IS Ongoing Maintenance Requirements:
Many IS managers have been under the mistaken impression that IS planning only deals with the development process. Maintenance costs for existing IS applications are becoming an increasingly important expense item for most firms, and planning for both new and existing applications should consider issues related to monitoring and control of the systems and for continuing maintenance of the systems.

Focus on Tools and Techniques Instead of on Real Business Needs:
There are a lot of methodologies, techniques, and tools that can be used for IS planning. Some IS managers lose sight of the goal of these tools and techniques, and focus on the methodology or processes more than on delivering systems to help business managers improve their operations or better meet customer needs. In the mid-1980s, it was particularly common for companies to overuse planning tools, and many such engineering driven planning approaches failed to ever deliver any outputs that were of strategic relevance for the firm.

In contrast, some companies have used relatively simple planning tools, such as the CSF analysis approach, to realize dramatic improvements in the allocation and planning for IS investments and resources. The key factor to keep in mind is that the entire IS planning process needs to be driven by and focused on providing value for business managers to meet real business needs.

Inability to Handle Change or Uncertainty:
One of the most common complaints about IS planning systems, and in fact, most business planning systems, is that they cannot deal effectively with changes or uncertainty. One planning tool that has been effective in dealing with uncertainty and change is scenario planning. Unfortunately,

change and uncertainty are part of the nature of the IS industry, but are also something that IS software and infrastructure often have a difficult time dealing with. There are no easy solutions to this issue, but use of a more flexible planning tool, such as scenario planning, can help IS and general business managers evaluate the potential implications of changes that might occur in the future. Managers can be much better prepared for dealing with uncertainty and change by considering how these changes or possible future states might affect proposed plans and what alternative decisions might enable the firm to be better positioned to deal with future challenges and capture future opportunities.

Vision or Architecture is Too Narrow and Short-Ranged:
Many early planning systems, particularly the early BSP approaches, focused too much on the needs of the business today rather than developing a vision or architecture that would support the firm's future needs. When business planning is used to drive IS planning with no input regarding the potential for IS or IT to create new strategic opportunities or change existing business processes, then IS planning can help firms automate existing processes to reduce costs or improve services. However, the larger potential payoffs that come from the integration of IT and business strategy for the firm require an interactive communications process. For firms in the Factory or Support quadrant of the IT strategic grid, this reactive approach for IS planning can be quite appropriate. However, for firms seeking to use IT to gain strategic advantages, it is essential that IS planning be closely integrated into the strategic decision making and vision development for the entire firm.

Obscure or Complex Planning Processes:
Some IS planning methodologies are very thorough, complex, and elegant; others are flexible but sometimes obscure. A planning process which is overly complex can be difficult to operate by mere mortals, and yet, may also require such a high level of detail that only very junior employees would have the patience to enter and work with the data required. There is a need for some degree of formalism, as too much flexibility can also result in poor planning and implementation. However, where possible, the planning inputs should be automated and levels of obscurity should be removed from the process and outputs. Simplicity and clarity in the planning processes and outputs are important objectives to keep in mind so that the formal data collection and entry process does not begin to take on a life of its own.

Other Common Problems Where Solutions Have Been Demonstrated
Other problems that are also common in the planning process are:

- Failure to deal effectively with applications integration;
- Insufficient evaluation of applications package options and trade-offs;
- Lack of effective risk assessment and management; and
- Failure to make use of existing best practices already proven and public knowledge from other firms in the industry.

Problems Without Solutions in any Current Planning Approach:
Some problems have no simple solution, but seem to be common in all planning methodologies. For example, virtually all planning solutions seem to require too much time from senior managers. Even two days during a year is far too much of a time commitment to the planning process in the minds of some senior managers. Even so, some planning experts argue that all managers should be involved in planning decision making as part of their daily jobs. However, getting senior managers to spend any amount of time participating in formal IS planning and resource allocation methodology can be difficult. Keeping the planning process as simply and clearly focused as possible will help encourage senior management involvement and will tend to reduce the time demands for these key managers. It is generally better to have:

- A less-rigorous planning process that involves senior managers in thinking about and making recommendations on key trade-offs; rather than
- A very sophisticated planning process that evaluates all possible considerations with lots of inputs to the system but that lacks senior management involvement due to the complexity and time required to be involved in the planning process.

Most planning systems also seem to work well in some environments and not well at all in others. This inability to cope with varied environments suggests that recommending a single planning approach or methodology that will work best in all firms in all environments is impossible. Each firm needs to experiment with alternative approaches and find a planning process that can work effectively within the industry, culture, and context of that specific firm. Thus, it is more important to learn how to use planning systems effectively across a variety of different methodologies than it is to find the perfect planning system somewhere in the market that will solve all the problems experience by your firm with the existing planning methods and processes.

Another common problem with virtually all IS planning processes is a failure to adequately consider human factors and issues in the IS infrastructure and systems development planning. Any changes in the organization require addressing complex human factors which are very difficult to address in the IS strategic planning process. It is very important for IS managers to be sensitive to these human factor issues and consult with operating managers. In some cases, the workers who would be influenced by the systems changes under consideration should also be consulted to determine how these human factors might influence systems design and development plans and costs.

5.12 RECOMMENDATIONS ON IS STRATEGIC PLANNING METHODOLOGIES

As the above discussion of alternative approaches and the common weaknesses of these various approaches points out, while many methodologies can be used for IS planning, none of these solutions are best for all applications. In addition, it is generally more important how well a particular methodology is implemented than what specific methodology is used. However, it is very useful to have some tools and techniques in place to assist with developing a strategic plan for IS, and no planning process or methodology is much worse than using a planning methodology which might not be the most suitable for your specific situation.

Therefore, we strongly recommend that companies begin implementing some form of planning process immediately if they have not been using any form of IS planning. If there is an IS planning methodology currently in use, try to evaluate how effectively the organization is using the existing process by examining the common weakness described above. The existing organizational planning process can almost always be improved through more effective implementation, which should be the first area targeted by IS management in efforts to improve the planning process. After improvements have been identified and implemented which are independent of the specific planning tools and methodology in use, then managers could usefully consider adopting alternative tools and methodologies which might fit better with the needs of the firm's culture, management skills, and environmental context.

Since it is impossible in this course to describe every possible planning system that could be used to improve IS strategic planning and management, we will only describe two very basic planning approaches in

the next two sections of this topic. These two methodologies have proven to be useful in IS strategic planning over many years. The first, CSF analysis, essentially provides IS managers and general managers with a useful approach for identifying the business needs of the organization and the relationship between existing IS capabilities and these organizational needs. The second approach, BSP, examines the detailed needs of the various business functions and processes of the firm for IS systems and capabilities and provides a means for developing an IS strategic plan to address these needs. These two approaches are very basic planning tools compared to the software tools and approaches that are available and in common use in the 1990s. However, they also provide much of the core foundation upon which many of these later methodologies have expanded to create these more complex and sophisticated approaches.

On the nature of IS strategic planning, highlights three of its natural characteristics:

1. The elements of the plan should be technically efficient · an analysis ought to be able to identify the optimal set of designs.
2. There is no single right or optimal design, since the plan preferred by any group of stakeholders depends on its own particular preferences.
3. The overall aims of the plan must necessarily result from a negotiation or political settlement among the parties having a stake in the plan.

A dynamic approach of IS strategic planning. Using this approach, the planning recognizes:

1. All forecasts can be expected to be wrong in significant ways · what actually occurs will differ significantly from what was originally predicted.
2. The plan should build in flexibility to deal effectively with the range of developments that may occur.
3. The desirable forms of creating flexibility can be identified using methods of risk analysis.

5.13 ETHICS AND IT

As a prospective managerial end user and knowledge worker in a global society, you should also become aware of the ethical responsibilities generated by the use of information technology. For example:

- What uses of information technology might be considered improper,

irresponsible, or harmful to other individuals or to society?

- What is the proper use of an organization's information resources?
- What does it take to be a responsible end user of information technology?
- How can you protect yourself from computer crime and other risks of information technology? (will be explained later)

Ethical and Social Issues and Systems

It is vital to understand that IS are considered to be relatively new entrants to the business world. Existing laws and regulations cover many aspects of IS. However, the nature of IS means that technological advancements are constantly evolving. Updating the laws and regulations is a matter of constant ponders.

Ethical issues are concerned with moral responsibility while social issues related to what is culturally/socially accepted. ICT system trends raise ethical and social Issues as shown in Figure 5.8 that have to be considered.



Figure 5.8: Ethical, Social Issues and Systems

Escalating rate of computing power

Computer use as well as computer function abilities are massively expanding. The organization should make sure that IS in use are not going against ethical and social concerns. They have to be morally sound and are accepted by the culture they are exposed to.

Constant development of data storage

The constant development of data storage methods results in the cost of

data storage decreasing. The way data is stored has to conform with ethical and social norm. Data has to be stored in a way that does not reveal information to parties who are not supposed to have access to such information unless with consent. The time period that information is held within IS should be made clear.

Techniques of extracting and analysing data are advancing

The advancement of extracting and analysing tools means that sensitive and personal data can be accessed in details and in an easier way. This is an alarming concept that has to be bore in mind by business organisations. Customer information for example has to be protected under ethical and social etiquettes and according to the law.

Communication and networking mediums are advancing

Advancements in communication and networking mediums imply that information can be accessed quicker and easier. The danger lies in the ability of outsiders to access personal information about customers for instance. There are benefits for such a trend. It facilitates a more effective and efficient transmission of information when used within the ethical and socially accepted practice.

Ethics in Information Society

- Organizations should be willing to take responsibility for their own actions – this is a basic ethical issue in information society lived in today. Business entities should fulfil their duties in relation to financial costs and expect and deal with consequences of decisions made.
- Organizations should review performance on the decision making process through effective and efficient use and flow of information. This involves collecting data, processing and storing, and giving out output data, in addition to feedback and review.
- Organisations should accept the liability to fulfil and pay for any breaches of IS in place. No system is free of fault. In addition, the nature of society businesses operate in has to face up to the constant evolvement of breach strategies.
- Appropriate implementation of the relevant laws has to be carried out by organisations. This is an ethical duty that ascertains that organisations are compliant with the rules and regulations.

Ethical Approach to IS

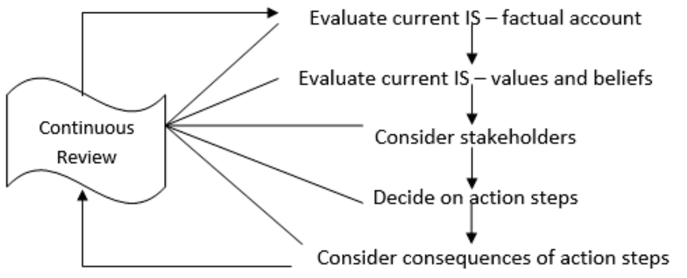


Figure 5.9: Ethical Approach to IS

Figure 5.9 illustrates an ethical approach to IS. The first step is assessing the current IS system from a factual point of view. This is followed by an evaluation of the current ethical system by taking account of values and beliefs. Direct and indirect stakeholders are then considered. This would be different depending on the type of business. In general, staff and customers are direct stakeholders, media can be considered as an indirect stakeholder. Action steps are decided on in the following step. This is where any ethical concerns need to be addressed in connection with the current IS. Consequences of the action steps are considered in the last step. Continuous review is carried out throughout the whole process to assure that continuous improvement strategy is implemented.

The Moral Dimensions of Information Systems

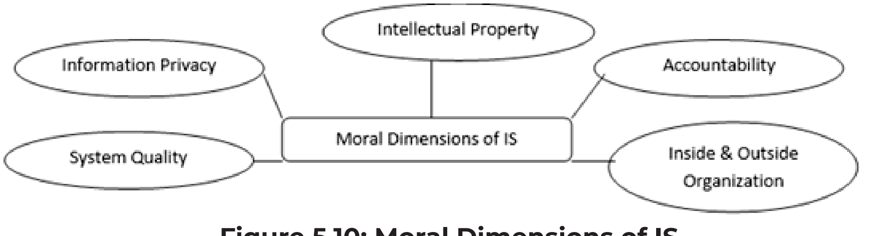


Figure 5.10: Moral Dimensions of IS

Figure 5.10 illustrates the moral Dimensions of IS which are: Information Privacy, Intellectual Property, Accountability, System Quality, and Inside/Outside the Organization which are discussed in the next subsections.

Information Privacy

Privacy is at the heart of the moral dimension of IS. Individuals disclosing information to organizations have the right to be aware of how this information will be used and by whom. These can be in the form of holding records of customers: name, address, phone number. It can also be customer username, password, etc. It is an obligation on the organization to clearly state how the information attained from individuals will be used, and whether any information will be passed on to third party organization. The organization has to obtain consent before it can pass information to other organizations. Cookies, Web bugs and spyware are some example of privacy challenges on the internet.

Intellectual Property

There are rules and regulations that determine how intellectual property should be morally protected by law. Types of intellectual property are: trade secret, copyright, trademark and patent.

Trade secret is when a certain aspect of the product/service is carried out for the organization solely and cannot be disclosed outside of the business entity. Copyright is concerned with protecting authored work from copying, using and distribution without permission. A legally registered trademark is a unique intellectual property that cannot be imitated or copied. A patent is when an inventor has the sole power to use their invention for a certain period of time.

All of these rights should be acted upon within IS.

Accountability

Accountability and control are important aspects of the moral dimensions of IS in businesses today. It is essential that it is clear who is responsible for what in a working environment. The purpose of each IS in place should be recognised, and consequently who is responsible for maintaining and fixing the system when a need arises. This helps the business keep a good control over its affairs and grants more credit and assurance to both staff and customers.

System Quality

The more widespread use of IS entails that there are higher risks of misuse. This can be in the form of: hacking, viruses, accessing payment card details, etc...

Hacking is when an outsider has access to data they should not have access to. Email passwords are very common targets. The whole computer can be hijacked disabling its functioning. This can be done through imposing viruses. Payment card details can be accessed unjustly through interrupting computer communication.

An organization should be aware of all the possible risks and should take action to ascertain that these breaches do not occur. Organizations should also be able to assure users of their services that information is secure.

Inside and Outside the Organization

- Narrow vs wide organizational hierarchy. More use of IS entails that there is a wide organizational hierarchy in place. This means that responsibility is spread among all the different levels, so more staff are involved in the decision making process on both operational and strategic levels. In general this is a good booster for staff morale.
- IS should facilitate integration and a wider span of ethnicity and social class of staff. This establishes a unique working environment where a common moral system is created in the work environment.
- Increased use of IS may means that less labour, or labour of different skills, are required.
- Health issues. Excess reliance and use of IS has some health implications. Individuals may be sitting, and using the computer for long period of times. Less human interaction may result in de-motivation and decreasing staff morale. Long working hours in general may cause distress. Organizations should encourage staff to take breaks throughout the working day, and should provide convenient surroundings in the work place to fulfil its moral duty from a health and safety point of view.
- Work life balance issue. More work can be completed from home through technological communication advances. This gives families the chance to fulfil the moral duty towards family (and social life) and work within a better work life balance.

SUMMARY

In this chapter compared some of the conventional methodologies for IS planning. You studied the critical success factors (CSF), their characteristics and sources, and their measurement. Later you also studied CSF analysis and its extension, as well as an example of use of the CSF approach at Boeing. You were introduced to the Business Systems

Planning (BSP) method of IS planning, its major activities, details of the various study steps, and its evaluation. Finally, you were shown how Earls multiple methodology might give a clear analytical view for IS strategic planning. You had also some discussion on the strengths and weaknesses of these methods and how they are selected to guide and IS planning exercise.

GLOSSARY

Building CSFs	· Are related to changes in the organization for future planning, such as improving the product mix.
Business entity	· Is something of lasting interest to an organization, something which can be uniquely identified and about which the organization wishes to keep data.
Business process	· Is a group of logically related decisions and activities required to manage the resources of the business? A process is not based on organizational structures, and it identifies what is done, not how.
Business systems planning (BSP)	· Is a structured approach to assist an organization in establishing an IS plan to satisfy its near- and long-term information needs?
Critical assumption set (CAS)	· Addresses the issue of beliefs about an organization, competition, industry, etc. that underlie a CSF.
Critical decision set (CDS)	· Defines those decision processes that will most affect the successful achievement of a CSF.
Critical information set (CIS)	· Defines those measures and associated data necessary to monitor, analyse and control the CSFs. This is the traditional product of a CSF analysis.
Critical success factors (CSFs)	· These are the limited number of areas in which satisfactory results will ensure competitive performance for the individual, department, or organization. For a business, the CSFs are those characteristics, conditions, or variables that when properly sustained, maintained, or managed can have a significant impact on the success of a firm competing in a particular industry.

Critical success factors (CSF) analysis	· Is a structured method to help managers determine their CSFs and thus identify their information needs?
Data class	· Is a logical grouping of data related to business entities that are significant to an organization?
Extended CSF analysis	· Uses the CSF analysis to provide the planning context in three critical domains: information, decision and assumption.
External CSFs	· Relate to factors in the outside world, such as company acquisitions or acquiring financing.
Internal CSFs	· Relate to actions that can be taken within the organization, such as improving product quality or lowering inventory costs.
Information architecture	· The structure of information systems and databases that will provide information to support the business.
IS application	· The computerized portion of a business process.
IS architecture	· The structure of information systems which supports an organization in its functioning.
Monitoring CSFs	· Involve the scrutiny of existing situations, such as monitoring the percentage of defective parts.
Stages of growth	· Stages of maturity with respect to the use and management of IT.

6 MANAGEMENT INFORMATION SYSTEM AND ENTERPRISE RESOURCE PLANNING

INTRODUCTION

The elementary convictions of MIS were to process data from the organization and present it in the form of reports at regular intervals. This conviction was altered when a distinction was fabricated between data and information. Information is an outcome of processed data, data being a set of values. This conviction was further altered, that's the system should present the information in such a form and format that is creates an impact on its user, provoking decision, an action and an investigation. It was later realized that some sort of selective approach was necessary for analysing and reporting, hence the concept of exception reporting was imbibed in MIS. Also, the need arose, for keeping all data together so that it can be accessed by anybody and can be processed according to their needs in different ways. This gave rise to the concept of DATABASE, which proved to be much effectual.

Over a span of time, the concept of end-user computing using multiple databases emerged, which unveiled a fundamental transition in MIS. This transition was the decentralization of the system. When this became actuality, the notion of MIS changed to decision-making system.

The foundation of MIS is the principle of management and its practices. MIS uses the concept of management control in its design and relies heavily on the fact that the decision-maker or manager is a human processor of information. It relies on the system theory that offers solutions to handle complex situations of the input and put flows using theories of communication.

Therefore, MIS is an art and science of gathering, collecting, storing, analysing and disseminating information for managerial decision making with due regard to the people of the organization.

On other hand side Enterprise Resource Planning" is a term originally

coined in 1990 by The Gartner Group to describe the next generation of MRP II software. The purpose was to integrate all facets of the business enterprise under one suite of software applications. The definition of ERP would be broadened to include almost any type of large integrated software package. A generalized definition of ERP as "a business management system that integrates all facets of the business, including planning, manufacturing, sales, and marketing." Some of the more well-known ERP software developers include SAP, Oracle, and PeopleSoft.

6.1 MANAGEMENT INFORMATION SYSTEM

MIS is prevalently demystified as the Information System, the Information and Decision System, the Computer-based Information System.

The MIS has more than one definition, some of which are given below:

- The MIS is defined as the system that provides information support for decision making in the organization.
- The MIS is defined as an integrated system of man and machine for providing the information to support the operations, the management and the decision making function in the organization.
- The MIS is defining as the system based on the data base of the organization evolved for the purpose of providing information to the people in the organization.
- The MIS is defining as a Computer-based Information System.

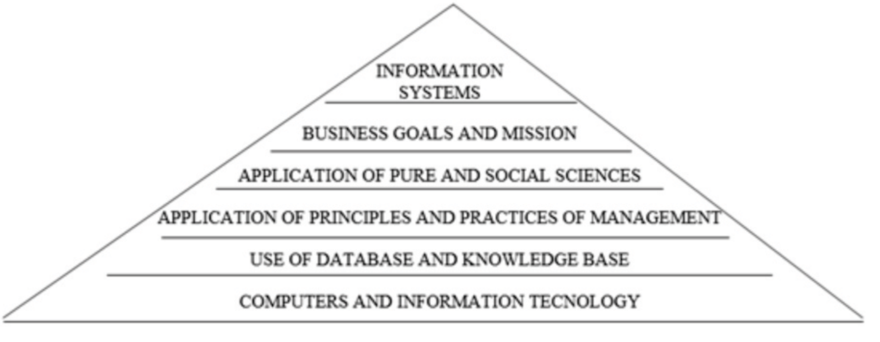


Figure 6.1: Conceptual View of an MIS

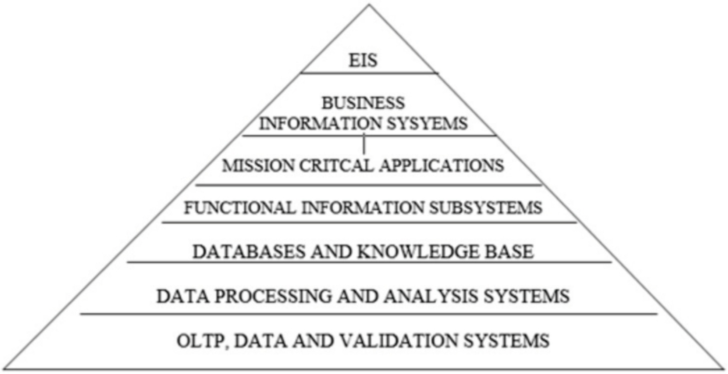


Figure 6.2: Physical View of an MIS

6.2 ROLE OF MANAGEMENT INFORMATION SYSTEM

The role of MIS is an organization that can be compared to the role of heart in the body.

- The system ensures that an appropriate data is collected from various sources processed, and then further sent to individuals, group of individuals or the management functionaries: the managers and the top management.
- It satisfies diverse needs through a variety of systems such as Query Systems, Analysis Systems, Modelling Systems and Decision Support System. MIS contributes to Strategic Planning, Management Control, Operational Control and Transaction Processing.
- It helps Clerical personnel in the transaction processing and answers the queries on the data pertaining to the transaction, the status of a particular record and references on a variety of documents.
- It helps Junior management personnel by providing the operational data for planning, scheduling and control, and helps in decision making at an operational level to correct an out of control situation.
- It helps Middle-Level management in short term planning, target setting and controlling the business functions.
- It helps Top management in goal setting, strategic planning and evolving the business plans and their implementation.
- It plays an important role in information generation, communication, problem identification and helps in the process of decision making

Thus, MIS plays a vital role in the management, administration and operations of an organization.

6.3 IMPACT OF MIS

Management Functions

MIS facilitates effective management of marketing, finance, production and personnel. It eases the tracking and monitoring of the functional targets. The functional management is informed about the progress, achievements and shortfalls in the activity and the targets. It helps in forecasting and long-term perspective planning. The manager's attention is brought to a situation that is in exception in nature, inducing him/her to take an action or a decision in the matter.

Understanding Business

MIS uses the dictionary of data, entity and attributes. Respectively, designed for information generation in the organization. Since all Information Systems use the dictionary, there is common understanding terms and terminology in the organization delivering clarity in the communication and a similar understanding of an event in the organization.

Systemization of business operations

MIS leads to streamlining the operations, which complicate the system design. It improves the administration of business by bringing a discipline in its operations, as everybody is required to follow and use systems and procedures. This brings a high notch of professionalism in the business operation.

Directing towards goals

It helps indirectly to pull the organization in one direction towards the corporate goals and objectives by providing relevant information to the people in the organization.

Management Efficiency

The fund of information motivates an enlightened manager to use a variety of tools of the management. It helps him to resort to such exercises as experimentation and modelling.

Reduction of manpower overhead

Since MIS works on the basic systems such as transaction processing and databases, the drudgery of clerical work is transferred to the computerized system, relieving the human mind for better work.

6.4 MIS AND THE USER

Every person in the organization is the user of MIS. The people in the

organization operate at all levels in the hierarchy. MIS caters to the needs of all.

Clerk

The main task of a clerk is to search the data, make a statement and submit it to the higher level. A clerk can use the MIS for quick search and reporting the same to the higher level.

Assistant

Assistant has the task of collecting and organizing data, and conducting a rudimentary analysis of it. MIS offers user tools to perform such tasks.

Officer

Officer has a role of integrating the data in different systems and disciplines to analyse it and make a critical comment if necessary.

Executive

Executive plays the role of decision-maker and a planner. He is responsible for achievement of targets and goals of an organization. MIS provides facility to analyse the data and offers the decision support system to perform the task of execution. MIS provides an action-oriented information.

Manager

Manager has the responsibility and accountability for business results. He/she is a strategist and a long-term planner, a person of foresight and analytical. MIS provides information in a structured or unstructured format to take actions. MIS caters to his changing needs of information.

Through MIS, the information can be implemented as a strategic weapon to ledge the threats to business, making business more competitive, bringing about the organizational transformation through integration. A good MIS also erects an organization seamless by removing communication barriers.

6.5 MANAGEMENT AS A CONTROL SYSTEM

A definition of control is the process through which managers assure that actual activities conform to the planned activities, leading to the achievement of the stated common goals. The control process measures a progress towards those goals, and enables the manager to detect the deviation from the original plan in time to take corrective actions before it

is too late. the points out the essential elements of the control process are given in the following figure.

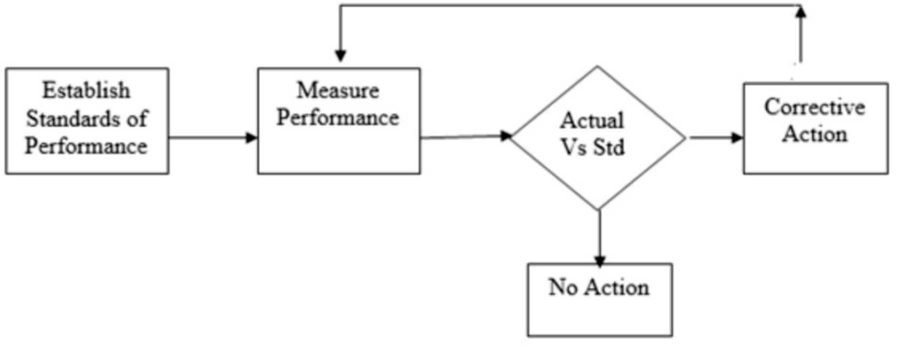


Figure 6.3: Control Process in Management

The management is a systematic effort,

- To set the performance standards in line with the performance objectives
- To design the information feedback systems
- To compare the actual performance with the predetermined standards
- To identify the deviations from the standards
- To measure its significance and to take corrective actions in case of significant deviations.

This systematic effort is undertaken through the management control system.

A reliable and effective control system has the following features.

Early Warning Mechanism

This is a mechanism of predicting the possibility of achieving the goals and the standards before it is too late and the allowing the manager to take corrective actions.

Performance Standards

The performance standard must be measurable and acceptable to all the organization. The system should have meaningful standards relating to the work areas, responsibility, managerial functions and so on.

Strategic Controls

In every business these are strategic areas of control known as the critical success factors. The system should recognize them and have controls instituted on them.

Feedback

The control system would be effective, if it continuously monitors of the performance and sends the information to the control centre for action.

Accurate and Timely

The feedback should be accurate in terms of results and should be communicated in time for corrective action.

Realistic

The system should be realistic to that the cost of control is far less than benefits. Sufficient incentive and rewards are to be provided to motivate the people.

The Information Flow

The system should have the information flow aligned with the organization. Structure and the decision-makers should ensure that the right people get the right information for action and decision making.

Exception Principle

The system should selectively approve some significant deviations from the performance standards on the principle of management by exception.

A support to the Management

The management process is executed through a variery of decisions taken at each step of planning, organising, staffing, directing, coordinating and control. The MIS aids deciion making suitably.

Decisions in Management

Steps in Management	Decision
Planning	A selection from various alternatives- strategies, resources, methods, etc.,
Organization	A selection of a combination out of several combinations of the goals, people, resources, method, and authority
Staffing	Providing a proper manpower complement

Directing	Choosing a method from the various methods of directing the efforts in the organization
Coordinating	Choice of the tools and the techniques for coordinating the efforts for optimum results
Controlling	A selection of the exceptional conditions and the decision guidelines

6.6 MANAGEMENT EFFECTIVENESS & MIS

Analysis of management effectiveness model as shown in figure 6.4, which generates an enterprise effectiveness in achieving goals and objectives. The model is puts a lot of emphasis on the management philosophy and the environment factors on which the effective ness is dependent. The environment factors provide the opportunities to survive and grow with certain constraints, while the management philosophy sets the guidelines for deciding the management practices to run the enterprise.

While environment factors are difficult to control, it is left to the management to change its philosophy towards the various players in the business, viz., the employees, the consumers, the suppliers, the government, the community and the shareholders. If the attitude is to treat the employees as business partners, we empower them and create a sense of belonging to the organization. Such an attitude will have an impact on the management practices where the employee will play a decisive role. It will affect the organization structure by reducing its size and the reporting levels.

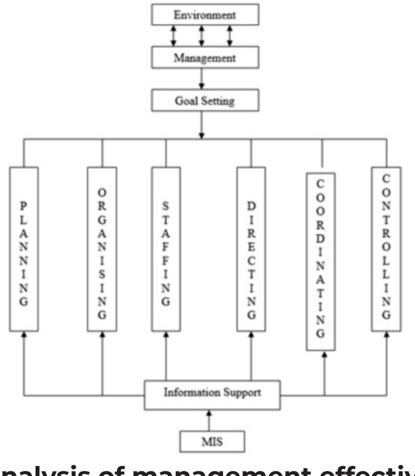


Figure 6.4: Analysis of management effectiveness model

If the attitude towards the consumer is changed to fulfil the expectations giving rise to a higher satisfaction, then the management practices in the product design, manufacturing and marketing will undergo a significant change. The product life cycle will be then a short, and more features and functions will be added to the product fulfilling not only the functional needs but also the service needs of the consumer.

The management practices therefore emerge out of the management philosophy and the environment in which it operates. The management effectiveness will largely depend on both these factors. The MIS design would, therefore, be different depending upon the management practices followed by several organizations in the same industry. Such design improves the management effectiveness leading to an improvement in the enterprise effectiveness.

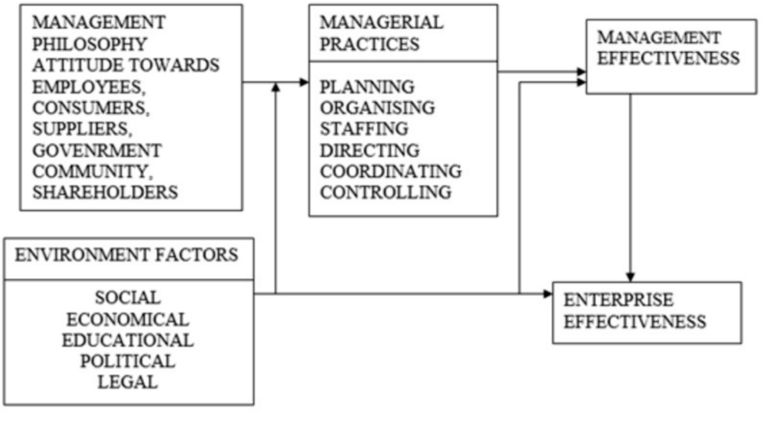


Figure 6.5: Negandhi Estafen Model for Analysis of Management Effectiveness

Goals, Objectives & Targets

The process of management begins with setting of goals, objectives and targets. The goals are long-term aims to be achieved by the organization; objectives are relatively short-term milestones to be accomplished, while targets generally refer to physical achievements in the organization's business.

- The setting of goals, objectives and targets is a top management function. It has its implications on the business operations and profits.
- It considers social, technological, political, educational, economical

changes expected to occur in five to six years.

- The setting of goals, objectives and targets helps to pull the resources of the organization in one direction and solve.
- It helps build strategies, frame policies and set the rules of conducting the business.
- It provides an effective measure to monitor the managerial process.
- The people in the organization can have a common understanding of the purpose of managerial process and business operations.
- The goals, objectives and targets become reference points for strategic planning and operation planning.
- It further helps the management to identify key areas of business and management attention.
- The performance appraisal of the manager become impersonal and unbiased as it is done with reference to achievement of goals, objectives and targets.
- Its advantage is that it stimulates the development of people and provides motivation

Organization as a System

Each employee has needs which, if congruent with the goals and objectives of the organization, should lead to high levels of performance and job satisfaction. When individual needs and organizational goals are not congruent, poor performance, resistance, and other dysfunctional consequences can result.

The introduction of an information system can alter the relationship between individual needs and organizational objectives. This section describes an approach to viewing organizations from both the individual and overall organizational perspective called Socio-technical approach, it is useful for dealing with the effects of new information systems.

The Leavitt model describes the organization as consisting of four interrelated components:

1. Task
2. Technology
3. Structure
4. People

The significance of Leavitt's model for understanding organizational change is that, because of the strong interdependence, a change in one component inevitably has effects, planned or unplanned, on the others.

The implicit approach of most system designers is to focus on the task and technology subsystems and completely ignore their effects on people and structure. Technology refers here generally to all tools used in task accomplishment.

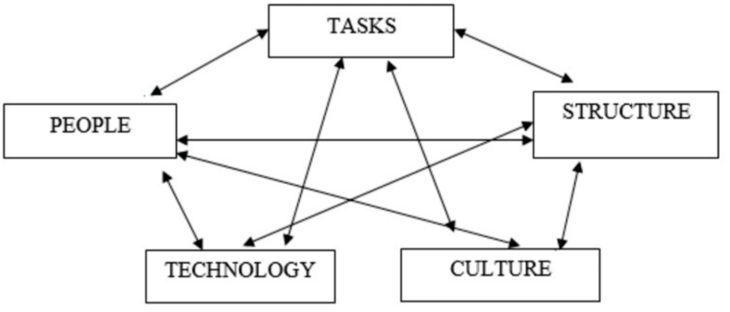


Figure 6.6: An Alternate Model of Organizational Subsystems Modified from The Leavitt Model to Include Culture

MIS: Organization Effectiveness

Management Information System (MIS) should be designed viewing the organization as discussed earlier. MIS plays a very important role in creating organization behaviour which in turn sets the goals for achievement. Technology & people decide the organization structure and style of the management.

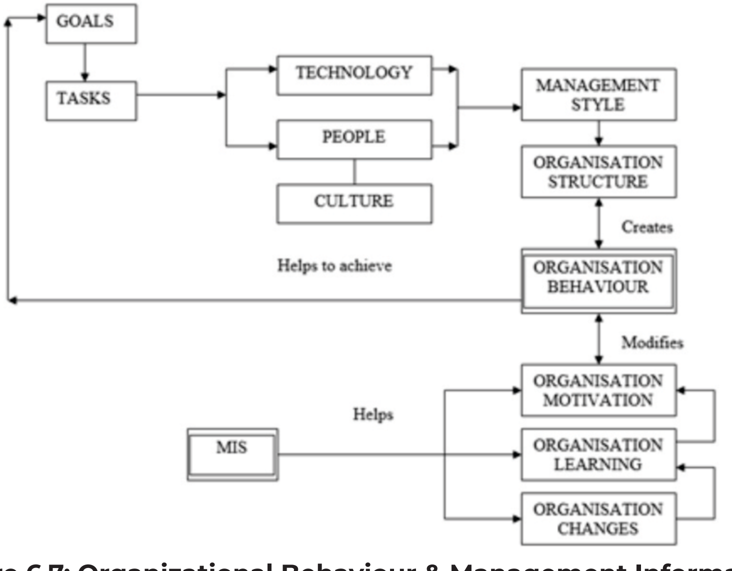


Figure 6.7: Organizational Behaviour & Management Information System

6.7 ENTERPRISE RESOURCE PLANNING

ERP is an acronym that stands for Enterprise Resource Planning. ERP software saw phenomenal interest from the corporate sector during the period 1995-2000. Substantial investments (often running into millions of dollars) were made in hardware, software, consulting and training to support ERP implementations. The ERP market is estimated to be in excess of USD 80 Billion in the year 2000. Significant benefits are associated with successful implementation of ERP in the Fortune 500 companies - in the form of faster inventory turnover, higher capacity utilization, faster time to market and overall profitability. Many analysts feel that today's global business environment - products and services customized to suit the individual needs of millions of customers, delivered over multiple timelines in a 24X7 basis - would have been impossible without such enterprise software. Undoubtedly ERP represents one of the most complex and demanding application software in the corporate environment.

ERP is a package software solution that addresses the enterprise needs of an organization by tightly integrating the various functions of an organization using a process view of the organization.



Figure 6.8: Enterprise Resource Planning

A. ERP software is ready-made generic software; it is not custom-made for a specific firm. ERP software understands the needs of any organization within a specific industry segment. Many of the

processes implemented in an ERP software are core processes such as order processing, order fulfilment, shipping, invoicing, production planning, BOM (Bill of Material), purchase order, general ledger, etc., that are common to all industry segments. That is the reason why the package software solution works so well. The firm-specific needs are met through a process of customization.

B. ERP does not merely address the needs of a single function such as finance, marketing, production or HR; rather it addresses the entire needs of an enterprise that cuts across these functions to meaningfully execute any of the core processes.

C. ERP integrates the functional modules tightly. It is not merely the import and export of data across the functional modules. The integration ensures that the logic of a process that cuts across the function is captured genuinely. This in turn implies that data once entered in any of the functional modules (whichever of the module owns the data) is made available to every other module that needs this data. This leads to significant improvements by way of improved consistency and integrity of data.

D. ERP uses the process view of the organization in the place of function view, which dominated the enterprise software before the advent of ERP. The process view provides a much better insight into the organizational systems and procedures and also breaks the "kingdoms" that work at cross-purposes in many organizations.

To implement such a demanding software one needs high performance computing, high availability systems, large, high-speed, high-availability on-line storage and high-speed, high-reliable networks, all at affordable cost.

In spite of heavy investments involved in ERP implementation, many organizations around the world have gone in for ERP solutions. A properly implemented ERP solution would pay for the heavy investments handsomely and often reasonably fast. Since ERP solutions address the entire organizational needs, and not selected islands of the organization, ERP introduction brings a new culture, cohesion and vigour to the organization. After ERP introduction the line managers would no longer have to chase information, check compliance to rules or conformance to budget. What is striking is that a well-implemented ERP can guarantee these benefits even if the organization is a multi-plant, multi- location global operation spanning the continents. In a sense ERP systems can be compared to the “fly-by-wire” operation of an aircraft. ERP systems

similarly would relieve operating managers of routine decisions and leave them with lots of time to think, plan and execute vital long-term decisions of an organization. Just as "fly-by-wire" operation brings in amazing fuel efficiency to the aircraft operation by continuous monitoring of the airplane operation, ERP systems lead to significant cost savings by continuously monitoring the organizational health. The seemingly high initial investments become insignificant in the face of hefty long-term returns.

At another level, organizations today face the twin challenges of globalization and shortened product life cycle. Globalization has led to unprecedented levels of competition. To face such a competition successful corporations should follow the best business practices in the industry. Shortened life cycles call for continuous design improvement, manufacturing flexibility and super-efficient logistics control; in short a better management of the entire supply chain. This in turn presupposes faster access to accurate information both inside the organization and from the entire supply chain outside. The organizational units such as Finance, Marketing, Production and HRD need to operate with a very high level of integration without losing flexibility. ERP systems with an organizational wide view of business processes, business needs of information and flexibility meet these demands admirably.

Thanks to developments in computing and communication technology, it is possible to network organizational units through reliable communication channels, providing tighter integration among them. The server technology today permits very high reliability and access to large data securely at reasonable cost. The open systems philosophy, client server architecture, high performance operating systems, RDBMS and Rapid Application Development tools are available today that permit such enterprise wide systems to be deployed.

These explain the motivating factors behind contemporary ERP systems.

6.8 ERP – A HISTORICAL PERSPECTIVE

ERP systems evolved from the Materials Requirements Planning (MRP) systems of the seventies and the Manufacturing Resources Planning (MRP II) systems of the eighties. Essentially MRP addressed a single task of materials planning within manufacturing function while the Manufacturing Planning Systems (MRP II) addressed the entire manufacturing function.

Industries such as automobile manufacture had large inventories of assemblies and sub-assemblies; often there were complex sub-assembly to assembly relationships characterized by Bill of Materials (BOM) involving thousands of parts. The need to drive down the large inventory levels led to the early MRP systems that planned the "order releases". Such planned order releases ensured the time phasing and accurate planning of the sub-assembly items.

A typical example from bicycle manufacture can illustrate the point - to manufacture 1000 units of bicycles, one needs 2000 wheels, 2000 foot-pedals and several thousands of spokes. On a given day, a plant may have 400 units of complete bicycles in stock, 6300 units of wheels, 370 units of foot-pedals and 87,900 units of spokes. If the plant is to assemble 800 units of bicycles for the next 4 days of production, determining the precise numbers of each of the items – foot-pedals, wheels and spokes – is a non-trivial problem. If the independent demand for spare parts is also to be taken into account, one can visualize the complexity. A typical automobile plant with hundreds, if not thousands of parts, has to face problems that are orders of magnitude more difficult. MRP systems address this need.

Using the processing power of computers, databases to store lead-times & order quantities and algorithms to implement Bill-of-materials (BOM) explosion, MRP systems brought considerable order into the chaotic process of material planning in a discrete manufacturing operation.

MRP II went beyond computation of the materials requirement to include loading and scheduling. MRP II systems could determine whether a given schedule of production is feasible, not merely from material availability but also from other production resource point of view. The increased functionality enabled MRP II systems provided a way to run the MRP II systems in a loop;

- First: to check the feasibility of a production schedule taking into account the constraints;
- Second to adjust the loading of the resources, if possible, to meet the production schedule;
- Third to plan the materials using the traditional MRP.

The nineties saw an unprecedented global competition, customer focus and shortened product life cycles. To respond to these demands corporations had to move towards agile manufacturing of products,

continuous improvements of processes and business process reengineering. This called for integration of manufacturing with other functional area including accounting, marketing, finance and human resource development. For example,

- Activity based costing would not be possible without the integration of manufacturing and accounting.
- Mass customization of manufacturing needs integration of marketing and manufacturing.
- Flexible manufacturing with people empowerment necessitates integration of manufacturing with HRD function.

In a sense the business needs in nineties called for integration of all the functions of management. ERP systems are such integrated information systems.

6.9 ERP – AN IS PERSPECTIVE

ERP systems can be viewed as a logical extension of the evolution of Electronic Data Processing (EDP), Management Information Systems (MIS), Decision Support Systems (DSS) and Knowledge Based Systems (KBS) systems over the past four decades. The EDP systems concentrated on the efficiency aspect to get mundane things like payroll calculation, inventory reports or census reports generated faster and accurately. The MIS systems addressed the operational information needs through effectiveness measures like exception reporting, insights into processes etc. The DSS used extensive modelling tools such as optimization, simulation and statistical analysis to reveal patterns in the information generated by MIS systems to genuinely support tactical and even strategic decisions. The KBS systems went beyond data, information and models to capture knowledge of the decision-maker and to use the captured knowledge to propose far superior innovative solutions.

Another categorization of applications view business systems as Office Automation Systems (OA), Online Transaction Processing (OLTP) and Decision Support Systems (DSS). OA included tasks like word processing, spreadsheets, presentation, e-mail & other communication tools that are generally used for personal productivity. OLTP systems use large databases, networks and mission-critical applications to improve the organizational productivity. DS systems address the needs of top management through Natural Language Processing, Expert Systems and other sophisticated tools.

Unfortunately, both the approaches missed out the key issue of integration. The EDP, MIS, DSS and KBS based classification assumes a compartmentalization across the layers of management. The OA, OLTP, DS classification assumes that the tasks are independent. Both assumptions are invalid in the real world scenario. The ERP systems remove the deficiencies by taking holistic view of information across the organization. ERP systems capture the essence of the business processes. It is driven by the business needs and not the IT needs. An IT driven solution often attempts to formulate a way of using a technique to solve a known business problem. The emphasis is on the usage of a technique or a technology. ERP systems take a business driven view. They solve the business problem using a combination of the tools and implement the best practices using contemporary technology. This explains the phenomenal success of ERP compared to many other systems.

6.10 COMPONENTS OF ERP

Typically, any ERP software consists of the following key features

· Finance Module with the following key topics

– GL Management accounting

– Balance Sheet and Profit & Loss statement

– Closing Procedures

· AR Customer management

– Invoice & Credit / Debit memo

– Dunning (reconciliation)

· AP Invoice receipt

– Payments

– Credit

– Invoice posting

With the following key function

· Consolidation

– Capital

– Debt

– Fiscal year choice

– Internal & external company reporting

· Financial Control

– Cash Management

– Electronic Banking

– Account clearance

– Cash management

– Foreign Exchange

- Asset Management
  - Loans
  - Stocks
  - Currency Exchange
  - Depreciation, Valuation, Plant Maintenance
- Funds Flow
  - Budgeting
  - Expense accounts
  - Funds availability control

With the added feature of using Common Chart of Accounts and with all transactions on-line

- Cost Module
  - Cost Centre Profit Centre Accounting
  - Cost element
  - Variance analysis
  - Transfer pricing
  - Profitability Analysis
  - Sales & profit planning
  - Contribution planning
  - Customer order and cost of sale accounting
- Order & Project Accounting
- Product Cost Accounting - Product, Job Order costing
- Performance Analysis including ABC
- Sales Module with the following functionalities
  - Sales Support including database, tele marketing
  - Customer call management
  - Inquiry, Quotation, Tendering, Order processing
  - Special order such as Cash Order
  - Contracts, Schedule agreement
  - Pricing including pricing plans
  - Shipping & Transportation
  - Invoicing
  - Sales Information Systems
- Production Planning Module with the following features
  - Sales Planning & Production Planning
  - BOM with many levels
  - MRP II Simulation
  - Capacity Planning
  - Plant Data Collection
  - Production scheduling & control

- Costing
- Project management
- Production Information Systems
- · Materials Management Module with features that typically include
- Forecasting
- Requirement Planning
- Vendor evaluation
- Purchase management
- Inventory management
- Invoice verification
- Warehouse management
- Customer managed inventory
- · Quality Module with features such as
- Quality planning
- Quality control
- Inspection
- Quality documentation (ISO 9000 support)
- Quality Information System
- · Plant Maintenance Module with such features as
- Maintenance planning
- Maintenance orders
- Asset history management
- Worker scheduling
- Integration with PLC
- Plant Maintenance Information System
- · Service Management Module with features such as
- Customer management
- Device management
- Warranty management
- Cost monitoring
- Service Information Systems
- · Human Resource Module with rich functionalities that include
- Master data management
- Payroll accounting
- Travel expense
- Time management
- Application processing
- Personnel development
- Manpower planning
- HR Information System

As can be readily seen the features are very rich, comprehensive and in turn complex; this explains the widespread interest as well as the confusion that surrounds typical ERP software.

Most ERP software provide extensive facilities for data protection, security, access control, automatic logging of key transactions, business model editors, data migration tools, reporting tools, MIS tools, data archiving tools, data warehousing and data mining capability either as part of the core product or through strategic partnership with Report writing software vendors, DBMS vendors, data storage vendors etc...

6.11 ERP LIFE CYCLE

Typically, ERP introduction in an organization goes through the following stages

a) Concept selling – In this stage ERP consultants take the top management through the ways in which ERP will help the organization in achieving the business goals. Generally, this process takes several weeks. The CEO, CFO, CTO and the CIO must be actively involved in this process.

b) ERP Feasibility Study – Once the top management is convinced of the role of ERP, consultants do a feasibility study that broadly quantifies the benefits, costs and the readiness of the organization for ERP implementation.

c) ERP Readiness – Once the feasibility is achieved the organization is readied for ERP by way of getting the IT and information infrastructure good enough for ERP implementation. This may involve hardware addition / upgradation, network upgradation and standardizing key business elements (account codes, material codes, cost centres etc.,) and key business processes (order entry, procurement, production, logistics, invoicing etc.,). Often this process leads to significant Business Process Reengineering (BPR). Depending on the context BPR could be a full blown exercise or integrated with ERP implementation. It is pragmatic to view the "best business processes" built into the ERP software as desirable for the organization and modify the existing processes to adapt to the ERP software.

d) ERP Software Selection – At this stage a detailed evaluation of the existing leading edge ERP software available and support in the local market is done (based on distributor availability, knowledgeable user / consultant support and training support). Some puritans postpone

software selection to a later stage.

e) Mapping "as is" processes and "to be" processes (through pragmatic reengineering) – At this stage, the existing organizational processes are modelled and using the combined expertise of the entire organization, the processes are improved to take advantage of the ERP. This process is often called the "reengineering process". Special tools to map processes, document processes and improve processes are available either as part of the ERP software or as independent software pieces under the name "process modelling software" such as ARIS Toolset or Visio Enterprise Edition.

f) ERP Implementation Plan – After the process mapping, the entire process of implementation is identified that includes the nature of implementation, extent of implementation, time schedule, cost schedule, training requirements, identifying key users, transition planning, data migration etc., A key issue is the nature of implementation – some users prefer "big bang" that implies all modules implemented across all departments of the enterprise in one go. Many others prefer module based implementation, say finance first, followed by sales...Yet others implement all modules in one location and roll out the modules in other location (in multi-location organizations). There is no universal "best" option; the user & consultant should jointly decide the choice. Generally, an ERP Steering Committee with the blessings and representation of the top management is constituted to supervise the implementation.

g) Actual Implementation – This stage involves the training of the users in the detailed modules, customizing the software to meet the specific needs of the enterprise, configuring the software to understand industry and firm specific practices (accounting, material, bill of material structures, scheduling practices, depreciation options, valuation of inventory / storage, stocking policies...)

h) Preparing to "go live" – At this stage the decision of project going live is decided. This may coincide with natural "roll over" dates such as beginning of the fiscal year, planning period etc., To keep the enthusiasm level of the people, a "kick off" function is organized to formally mark the "go live" phase of ERP. All account related start-up figures are fed into the ERP software.

I) "Go live" - when the organization starts using the ERP software. Post implementation – In this phase the ERP software performance is fine tuned to meet the user's needs. Often more reports as demanded by the user community is identified and designed.

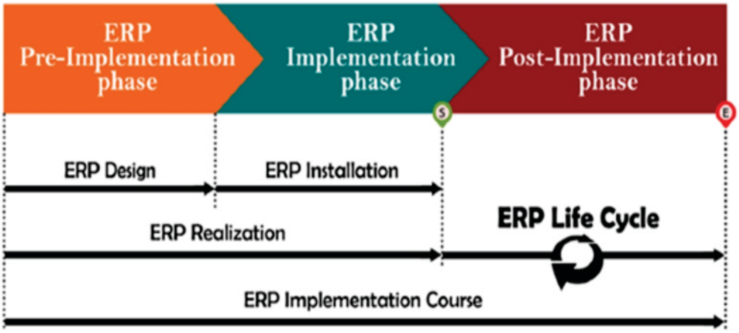


Figure 6.9: Enterprise Resource Planning (ERP) Life Cycle

6.12 THE BENEFITS OF ERP

Data discipline, build-up of solid information infrastructure, integration across firm-level functions (finance, production, marketing and HR), process orientation at the level of internal processes, significant usable transactional data generation are some of the real benefits of ERP. Data discipline provides an ability to try out new business models that are necessary in the connected world; a solid information infrastructure provides robustness and control in the "mergers and acquisition" dominated volatile business world. Firm-level integration provides foundation for integration across suppliers and customers. Process orientation within an enterprise, that is characteristic of ERP, is another key benefit.

6.13 ERP AS INFORMATION INFRASTRUCTURE FOR AN ENTERPRISE

The key benefit of ERP implementation is that ERP provides a solid information infrastructure for an enterprise. As an infrastructure, ERP data is shared by all departments across the organization and owned by all users. ERP is NOT one more project initiative from EDP/ MIS/ IT departments. ERP also ensures ready data availability. A well-implemented ERP would pave the way for organizational level data discipline. With "Information available on tap", it is important that the users start planning for innovative use of this information for planning & analysis. Finally, infrastructure should not be viewed from a narrow "cost benefit" and ROI perspective. The true benefits of ERP are not necessarily apparent on day one. Accordingly benefit cost ratio might unduly overemphasize costs that are apparent and underemphasize benefits that may not be apparent. Like every other infrastructure - roads, seaports, airports, telecom and railways – information infrastructure in the form of ERP needs a different mind-set too. It must be noted that investments in

infrastructure pays by the innovative ways in which the infrastructure is put to use – investments in roads pays off through returns from trucking industry, business generated through phone calls pays for investments in telecom network – similarly innovative use of data generated through ERP would pay for ERP investments. The improved organizational agility provided by ERP must be put to good use.



Figure 6.10: Information Infrastructure for Business

6.14 ERP AND SUPPLY CHAIN MANAGEMENT (SCM)

With every enterprise setting up web-based storefront with fancy shopping carts, order processing has become relatively simple for the end users. It is particularly true of B2C (Business to Consumer) scenario. As the Christmas 1999 season proved, it is NOT sufficient to build easy-to-use electronic storefronts. There must be a rugged ERP-class backend system to support thousands of customers and variety of products that can be sold on 24X7 basis throughout the year. More important is the ability to manage the logistics of supply of raw materials that are needed for the production of items to meet the orders taken over the electronic storefront. One must also manage multiple levels of supply and in-house store – finished goods, work-in-process, raw materials and even consumables across the entire supply chain.

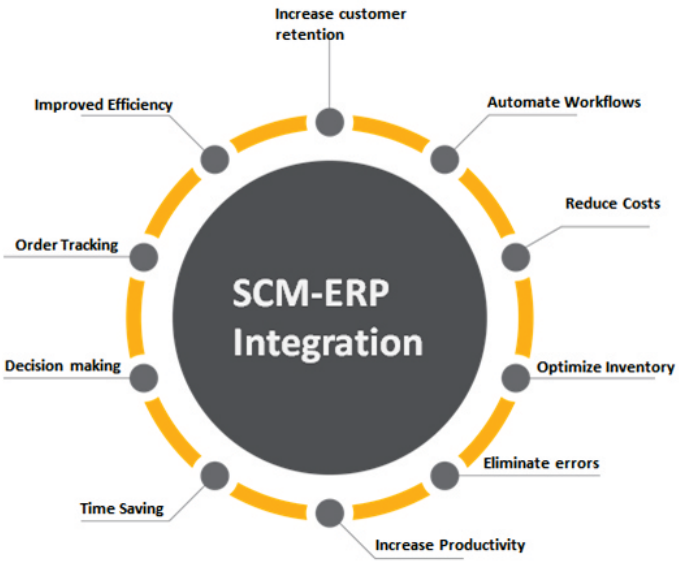


Figure 6.11: ERP and SCM

Ultimately the delivery of the items to the end customer at the right time at right cost must be guaranteed too. All this calls for advanced planning and optimization of goods and services across multiple echelons. This exercise calls for sophisticated multi-stage optimization systems with superior performance to handle millions of customers, thousands of orders and hundreds of products – the core of Supply Chain Management software. Once again SCM software has changed too – it is not limited to manufacturing execution and sophisticated planning. SCM is merging into e-business scenario, permits web-based usage, works across corporate intranets and extranets and triggers production planning systems from supply planning through sophisticated middleware – powerful application integration indeed.

6.15 ERP AND CUSTOMER RELATIONSHIP MANAGEMENT (CRM)

Corporate applications of the nineties concentrated on internal efficiencies. With functional integration, process orientation and "best of breed" practices embedded in the software, internal users did get significant benefits. Corporations gained through better cost control, inventory reduction, reduced cycle times, improved resource utilization etc., With the arrival of the World Wide Web (WWW) and the surge in interest in e-commerce, the interest shifted from back office to front

office. Once the front office is the focus area, customer moved to the centre stage. The super-efficient ERP systems had also built solid information base about past customers – their buying pattern, their product preferences, payment preferences, shipping preferences, location preferences, brand preferences and even time preferences, thanks to solid transaction handling capability of ERP systems. Thanks to the technology of data warehousing and data mining, the customer information and transaction information that has been "logged" religiously by ERP systems and faithfully "backed up" could turn into "goldmines" of information. The retail industry could launch "market basket analysis", the telecom industry could perform "churn analysis", the financial industry (particularly credit card firms) could predict spending pattern that can be used to target focused advertisements.

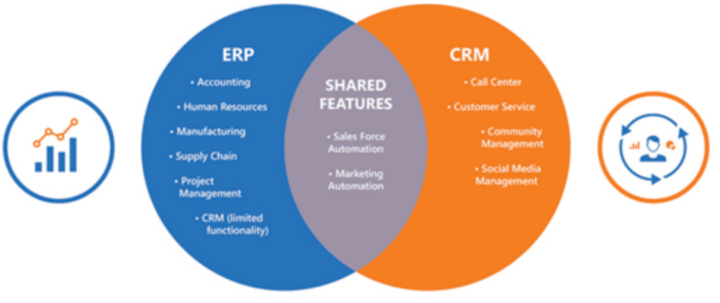


Figure 6.12: ERP and CRM

It is important to realize that many of these data mining could not have been attempted before the ERP systems were running for several years. It is interesting though that in some industries like telecom and banking, the benefits of using customer information through Customer Relations Management (CRM) far outweigh the benefits of ERP, proving that the customer is still the king, even in Internet age! In addition, e-CRM addresses not only CRM in the Internet age but also CRM in the specific context of web-based business processing; and even processing associated with Dot.Com companies. For example, pure Dot.Com companies like Yahoo and AltaVista and Web-hosting companies like Exodus need guaranteed web-serving performance at customer end. To manage "page to page" refresh time across millions of customers under varying load is a very demanding customer service. Issues like personalization, studying customer navigation in user sites and "delivering" information "most relevant" to the individual customer preferences are challenging.

6.16 ERP and Y2K

In the late nineties many organizations implemented ERP because of their need to get Y2K-compiant software, though implementing ERP just for Y2K readiness may be an overkill. The past few months also were post Y2K months; users and CIO's no longer look at Enterprise Systems, particularly ERP systems, to get over Y2K problem; they look for business benefits. The feverish growth of ERP in the late nineties was fuelled by the CIO's wanting to put in place some systems that guarantee Y2K compliance. The integration benefits offered by ERP systems were overshadowed by their guaranteed Y2K compliance. Also some of the dominant ERP vendors such as SAP had by their stature, a hidden stamp of approval for the Y2K compliance; CIO's discovered that certification from less-known software houses was not that easy to "sell" to their CEO's. All these factors compounded stalled the growth of ERP in the past two years. Yet ERP is not "finished" by any standards – McKinsey Quarterly estimates almost $ 185 Billion for the year 2020!

The last six months of 1999 were tense moments for most CIO's. The supposedly imminent Y2K doom was writ large on their faces. Thanks to the fear of Y2K, the management attention it got and the media hype, Y2K came and practically went away without much noise. Call it better preparation to face the disaster or over-estimation of the possible impact of the Y2K disaster, Y2K was handled exceptionally well by MIS managers. Thanks to Y2K again, IT spending was very much controlled in the last six months of 1999. The worst to suffer was Enterprise Systems – ERP, SCM and the like. Most CIO's postponed their decision till the new millennium was born.

6.17 ERP and E-Commerce

E-Commerce is creating new electronic markets where prices are more transparent, markets are global. Electronic commerce is having a direct impact on the firm's relationship with suppliers, customers, competitors and partners. Electronic commerce can be used to reduce supply chain costs, increase production efficiency and tighten the relationship with customers. This course is designed to help students analyse the various business models. will also explore the reasons why the early e-Commerce ventures failed and the strategic, financial, marketing and organizational challenges they faced.



Figure 6.13: ERP Systems as an e-Commerce Entity

Types of E-Commerce

Every Internet business is either pure-play or brick-and-click. A pure-play business, such as Amazon and Zappos, has an online presence only and uses the capabilities of the Internet to create a new business. Brick-and-click businesses, such as Barnes and Noble and Vermont Country Store, combine a physical presence with an online presence. These businesses use the Internet to supplement their existing businesses.



Figure 6.14: Types of e-Commerce

There are several different types of e-commerce. A common classification system is with respect to the nature of transactions or the relationships among participants. There are seven major types of e-commerce:

1. Business-to-business (B2B) e-commerce, where businesses focus on selling to other businesses or organizations, is the largest form of e-commerce. E-commerce: Business, Technology, Society Information Technology (IT) and IT networks for the small- and medium-sized business) are all B2B companies.
2. Business-to-consumer (B2C) is the earliest form of e-commerce, but it is second in size to B2B. It refers to retail sales between businesses and individual consumers. Consumers gather information; purchase physical goods, such as books and clothing; purchase information goods, such as electronic material or digitized content, such as software; and, for information goods, receive products over an electronic network.
3. Consumer-to-consumer (C2C) e-commerce is where consumers sell products and personal services to each other with the help of an online market maker to provide catalogue, search engine, and transaction-clearing capabilities so that products can be easily displayed, discovered, and paid for. The most well-known C2C business is eBay, but there are many other online market makers as well. Craigslist is an extremely popular small e-commerce business for placing classified ads.
4. Business-to-government (B2G) e-commerce can generally be defined as transactions with the government. The Internet is used for procurement, filing taxes, licensing procedures, business registrations, and other government-related operations. This is an insignificant segment of e-commerce in terms of volume, but it is growing.
5. Consumer-to-business (C2B) e-commerce is between private individuals who use the Internet to sell products or services to organizations and individuals who seek sellers to bid on products or services. An example of C2B where a consumer posts a project with a set budget deadline and within hours' companies and/or individuals review the consumer's requirements and bid on the project. The consumer reviews the bids and selects the company or individual that will complete the project. Empowers consumers around the world by providing the meeting ground and platform for such transactions.
6. Mobile Commerce (m-commerce) refers to the purchase of goods and services through wireless technology, such as cell phones, and handheld devices, such as Blackberries and iPhones. Japan has the lead in m-commerce, but it is expected to grow rapidly in the United States over the next several years. E-Marketer predicts mobile content revenues will grow to more than $8.58 billion in 2020, a compound annual growth rate of nearly 20 percent for the period 2010–2015, with

the fastest growth coming from mobile music.

7. Peer-to-peer (P2P) technology makes it possible for Internet users to share files and computer resources directly without having to go through a central web server. P2P began with Napster offering free music downloads via a file-sharing system. Free Encyclopaedia of Ecommerce. The world's first P2P commerce system launched in 2005, which allowed people to sell every type of digital media directly from their computers to customers all over the world. People who publish videos, photos, music, e-books, and so forth can earn royalties, while buyers earn commissions for distributing media to others.

Although these types of e-commerce have been discussed individually, there are many instances in which one company engages in multiple types. Office Depot and Staples are brick-and-click businesses that engage in B2B, B2C, and perhaps B2G e-commerce.

E-Commerce Business Models

The decision to engage in e-commerce is an important one. The advantages are clear: lower business costs; 24/7 accessibility anywhere; the potential for stronger customer service; the ability to introduce a niche product; the ability to reach global markets on a more equalized basis with larger firms, making mass customization possible; and greater customer loyalty. But the risks are there as well. Internet problems, website problems, security and privacy breaches, intellectual property theft, legal liability, product and/or service failure, customer deceit, and customer dissatisfaction are but a few of the risks. Therefore, the choice of an e-commerce business model must be made carefully. Each model will have different implications in terms of business planning and strategy.

An e-commerce business model is the method that a business uses to generate revenue online. "The business model spells out how a company makes money by specifying where it is positioned in the value chain. Some models are quite simple. A company produces a good or service and sells it to customers. If all goes well, the revenues from sales exceed the cost of operation and the company realizes a profit. Other models can be more intricately woven. Another way to look at a business model is that it "reflects management's hypothesis about what customers want, how they want it, and how the enterprise can organize to best meet those needs, get paid for doing so, and make a profit. There are many models to choose from, and new models will continue to emerge as technology evolves and businesses look for new and creative ways to generate revenue.

E-Commerce Trends

For businesses already engaged in e-commerce and for those that are thinking about it, being aware of the latest e-commerce trends is important because they could have a long-term influence on the future of a company's market. This influence, in turn, could mean life or death for your e-commerce operations. Several general e-commerce trends can be identified, and they are relevant to all e-commerce operations.

ERP with E-Commerce

It is true that during 1996-98 ERP was the "talk of the town". Starting 1999, thanks to Dot.Com phenomenon the "flavour of the year" was clearly E Commerce. Companies were busy setting up store-fronts on the cyberspace, putting catalogues online, setting up websites with "bells and whistles", signing up web-hosting contracts, putting in place a Net strategy, hiring consultants to get a Net marketing in place to attract and retain "eyeballs", understanding payment systems, ensuring interactivity on their sites through mail, chat, discussion groups, opinion polls etc. But the December 1999 Christmas fiasco in USA clearly proved that without an Enterprise System (call it ERP or whatever) in place, one would not be able to manage all - customers, orders, inventories, suppliers and logistics - particularly in "physical" goods industries. The Dot.Com burst in the latter half of the year 2000 brought some sanity to the enterprise growth.

ERP is inward focused– it looks at the enterprise. E-Commerce is outward focused – it looks at the customers. To deliver value and succeed in business, you need both ERP & E-Commerce. Dell Computers had initially put a stop to SAP because Dell found ERP was too rigid; today Dell E-Commerce solution works with ALL ERP software! Since Dell sells to UniLever, GM and Boeing, Dell's E-Commerce solution should co-work with all the ERP systems of Dell's customers. Dell primarily assembles PC's and Servers; naturally their processes are far simpler. But for companies like Boeing and GM with complex operations, ERP is far more important. But everyone needs both E-Commerce and ERP. Their relative importance will vary with the nature of a specific company's operations. While E-Commerce may be more important for a company like Dell that sells computers directly to millions of end customers globally, ERP may be more important for a company like Boeing that sells far complex equipment to just dozens of Airlines.

The message is loud and clear – it is NOT ERP or E-Commerce; it will always be ERP and E Commerce – both today and tomorrow.

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